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IN THIS ISSUE

THE relationship between the age at which children enter school and their reading ability several years later is examined by Dr. Ernest Gruenberg and Herbert Birch in "Reading Skills and School Entrance Age." The scores obtained on reading achievement tests by third to sixth grade children in Onondaga County, New York, are related to their age at school entrance, their chronological age and the number of years of schooling. Children whose "reading age" was 12 months or more less than their chronological age were on the average 5.3 months older at school entrance than the children not retarded in reading skill. At each chronological age, those in the earlier school entrance group scored higher in reading; but when the number of years in school was the same, the older children scored higher. Thus, those who entered school later had made more progress in reading per unit of time than the younger age entrants, but the latter had higher average reading scores at a given age up to 12 years of age.

• • •

The records from the Nutrition Clinic of the Pennsylvania Hospital in Philadelphia provide the data for an analysis of infant growth entitled "Size and Growth of Babies During the First Three Months of Life." This report by R. V. Kasius; A. Randall, IV.; M.D.; W. T. Tompkins, M.D.; and D. G. Wiehl, is the third in a series of studies of the newborn from the Clinic. Comparisons of the average values of the measurements of weight, length, and chest circumference during the three months after birth are presented for white and Negro infants by sex,

as are figures showing the relative growth in weight and the two body dimensions during this period.

• • •

The reduction of the birth rate in Japan has been one of the most amazing developments in postwar population trends. A widespread desire to limit size of family in Japan apparently has been implemented in part by contraception and induced abortion, but also by resort to sterilization. The developments in contraception and induced abortion in Japan have been described, respectively, in the proceedings of the Fund's 1952 Annual Conference and in the July, 1954 *Quarterly*. The present issue contains a report, "A Survey of Health and Demographic Aspects of Reported Female Sterilizations in Four Health Centers of Shizuoka Prefecture, Japan." The paper was prepared by four physicians: Drs. Yosio Koya, Minoru Muramatsu, and Sakito Agata of the Institute of Public Health, Tokyo, and Dr. Naruo Suzuki of the Shizuoka Prefectural Health Department.

• • •

Some months ago the Population Council and the Milbank Memorial Fund agreed to supply the funds that were required for some tabulations concerning differential fertility from the 1950 Census punch cards on fertility. These data will constitute the basic materials for a 1950 Census monograph on fertility which is being prepared by Wilson H. Grabill of the Bureau of the Census, P. K. Whelpton of the Scripps Foundation for Research in Population Problems, and Clyde V. Kiser of the Fund's staff. A preview of trends in fertility and fertility differentials by occupation of the husband and by age, color, residence, and education of the wife is presented in this issue by Clyde V. Kiser in the article entitled "Changes in Fertility by Socio-Economic Status During 1940–1950."

• • •

One of the hypotheses in the Indianapolis Study was that the stronger the interest in, and liking for, children the lower is the proportion of couples practicing contraception effectively and the larger is the planned family. The data pertinent to this hypothesis are presented in an article by Lois Pratt and P. K. Whelpton, "Interest in and Liking for Children in Relation to Fertility Planning and Size of Planned Family." This is the twenty-ninth of a series of analytical reports appearing in the *Quarterly* under the general title "Social and Psychological Factors Affecting Fertility."

READING SKILLS AND SCHOOL ENTRANCE AGE

ERNEST M. GRUENBERG,[1] M.D. AND HERBERT BIRCH,[1] PH.D.

IS there an association between reading disabilities in school children and early school entrance? How does a year of schooling at five years of age affect the level of reading skills achieved several years later?

Data on these separate, but related, questions are reported in this communication. Part I deals with reading retardation while Part II deals with the effect of early entrance on later reading skills.

I

A report by Cunningham (1) in 1948 of an outbreak of reading disability in Connecticut lends credence to the proposition that children who are sent to school at an early chronological age tend to develop reading disability more often than children who start school later. While the experience recorded by Cunningham is not conclusive in this respect, it is suggestive and in keeping with the thinking of those educational psychologists who believe that premature training hampers later learning.[2] This study is a further attempt to apply a limited test of this

[1] From the Community Mental Health Research Center, New York State Dement of Mental Hygiene, Syracuse, New York.

Grateful acknowledgment is hereby made for assistance from Isabel McCaffery, Biostatistician; Sally Holston and Arthur Lefford, Research Assistants; M. Whitmore, H. Gordon, C. Hayeman and M. Kelly, Clerical.

[2] e. g. "An example of what may happen to a child who is sent to school before he is ready to read is the case of a seven-year old boy who was referred to a clinic to determine whether he should . . . be sent to an institution for the feebleminded.

". . . His history showed that his mother had given his age incorrectly so that he might enter the school at five years.

". . . At first the child showed some interest in reading, but made no progress. Gradually he began to associate failure and dissatisfaction with reading. . . ."

Merry, F. K. and Merry, R. V.: THE FIRST TWO DECADES OF LIFE. New York, Harper & Brothers, 1950. p. 500.

"The age of starting school, especially when viewed in the light of the child's M.A., may help to explain lack of success in primary reading."

Louttit, C. M.: CLINICAL PSYCHOLOGY OF CHILDREN'S BEHAVIOR PROBLEMS. New York, Harper & Brothers, 1947, p. 279.

proposition as it applies to a group of school-age children in certain small upstate New York communities.

The New York State Youth Commission, in connection with another study, arranged for the testing in April, 1948, of all children in the third, fourth, fifth, and sixth grade of twenty-four schools in Onondaga County outside the City of Syracuse. For most of the 3,662 children registered in these grades, the Youth Commission obtained: (1) reading achievement scores (Stanford School Achievement Test, Primary Battery Form B), (2) non-verbal IQ scores (California Test of Mental Maturity), and (3) chronological age at the time of testing. All tests were administered in the children's own school rooms according to a standardized procedure under the general supervision of the research staff of the Youth Commission. These data have been kindly made available through the courtesy of Lee Dowling, Executive Director of the New York State Youth Commission. Grateful acknowledgement is expressed to the Youth Commission for making these data available.

Subsequently, staff members of the New York State Mental Health Commission visited each of the twenty-four schools involved in the study and obtained school entrance ages for 3,183 pupils for whom test scores were available.[3] In this study, those children whose reading age was 12 or more months less than their chronological age were labeled "retarded" in reading. The difference in entrance age between the "retarded" group and the "non-retarded" group may be evaluated by the following data:

	No.	*Mean Entrance Age (Months)*	*S.D.*
Retarded	973	71.07	11.08
Not "Retarded"	2,210	65.81	8.60
Total	3,183	67.42	9.73
		$t = 13.18$	$P < 0.001$

[3] Grateful acknowledgement is hereby made to the District Supervisors and Principals who made this possible.

The more "retarded" in reading skills had an average entrance age later than the non-retarded. This finding throws doubt on the proposition that early school entrance generally leads to deficiency in the development of reading skills. However, it does not settle the issue conclusively because there are many serious limitations to the data organized here.

Factors other than those controlled in this study may have influenced these results. It is possible that systematic differences existed between the younger and older entrants in terms of (1) individual and family characteristics related to successful integration with the school system, and (2) the type of educational experience provided them by the schools.

We may speculate that more of the later entrants suffered from physical diseases which both delayed their school entrance and presented a handicap to later school adjustment and learning. Families of earlier entrants may be those who place a higher value on schooling and make active attempts to motivate their children to successful school achievement. On the other hand, more of the younger entrants may have had mothers who were working and found it difficult to establish a satisfactory home atmosphere. In those school systems which had kindergartens, it is reasonable to assume that more of the younger entrants were assigned to them, while more of the older children entered first grade directly.

The data of this study are not capable of ruling in or out any of these speculations.

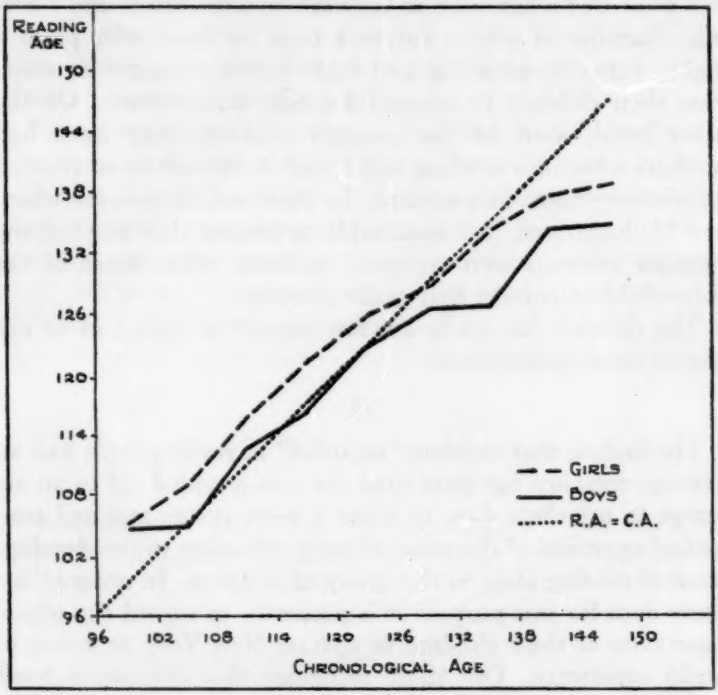
II

The finding that children "retarded" in reading skills had an average entrance age later than the non-retarded led to an attempt to use these data to make a more systematic and controlled appraisal of the value of early schooling to the development of reading skills in this group of children. In order to use these data for this purpose it is necessary to regard the school experience of these children in upstate New York as a unit of social experience. One must recognize that different schools

followed different practices. They were not under the same supervision and different schools may have varied greatly in the way they approached the older or the younger child on first entrance to the school system. However, assuming that schooling is an organized experience with variations: What is the effect of this experience for children of different ages in respect to the rate at which they develop reading skills?

The sample for this analysis consists of 2,556 of the children who first entered school in a fall semester between 54 and 83 months of age, and were at the time of testing between 96 and 155 months old. The reading ages of these pupils were cross tabulated by six-month entrance age groups (54–59, 60–65, etc.) and by six-month chronological age groups at time of test-

Fig. 1. Reading age by chronological age.

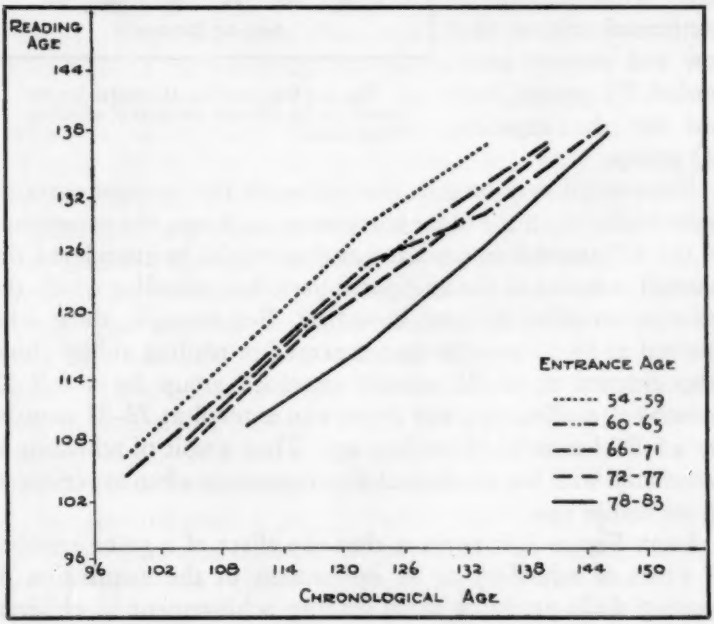


ing (96–101, 102–107, etc.). This type of cross tabulation was made separately by sex for each of three non-verbal IQ groups, IQ below 90, IQ 90–109, and IQ 110 or above. However, in this paper, only certain general findings will be reported.

Figure 1 shows the course of development of the mean reading age by chronological age for boys and girls separately. Also indicated is a line in which reading age = chronological age. Presumably this latter line would represent the normal population on which the reading achievement tests were standardized. It may be noted incidentally that the mean reading age of girls is higher than that of boys for each chronological age group. This sex difference in reading age is maintained within the lower and average non-verbal IQ groups, but is not as marked within the superior IQ group.

What happens to the reading ability of children who spend

Fig. 2. Reading age by chronological age for each entrance age (both sexes).



an additional year out of school as compared to children who spend the same year of their lives in school? Figure 2 indicates that the mean acquisition of reading skills is greater at each chronological age for the children who entered school earlier than for the children who entered school later. In general, the youngest entrance age group (54–59 months) scored highest and the oldest entrance age group (78–83 months) scored lowest for a given chronological age. This finding is confirmed within the low and average nonverbal IQ groups, but not for the superior IQ group.

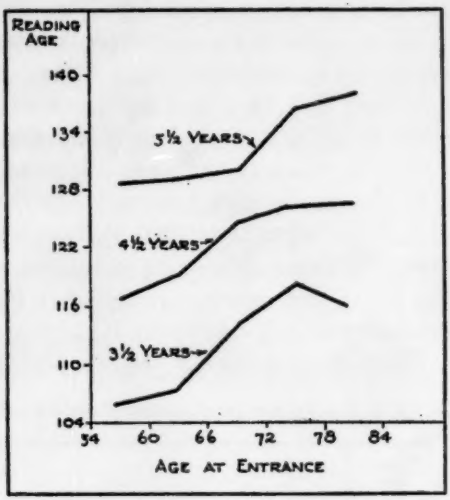


Fig. 3. Mean reading age scores by entrance age for different amounts of schooling (both sexes).

However, it may be seen that although the younger entrants score higher than the older entrants at each age, the magnitude of the difference is somewhat less than might be considered the natural outcome of the additional period of schooling which the younger entering children have had. For example, those who entered at 54–59 months do not exceed in reading ability those who entered at 66–71 months entrance group by a full 12 months of reading age, nor those who entered at 78–83 months by a full 24 months of reading age. Thus a unit of schooling is associated with less reading-ability increment when experienced at an earlier age.

From Figure 3, it appears that the effect of a given number of years of schooling as an investment in the acquisition of reading skills produces more reading achievement in children

who have entered school nearer their seventh birthday than on those entering near their fifth birthday. Although not shown in the chart, this finding holds for both boys and girls within each of the three IQ groups.

These findings suggest that children who start to school nearer their fifth birthday have more opportunity to realize their maximal capacity for reading ability than children who enter school later in life, in that the younger entrants to school in this population scored higher on the achievement test than the older entrants, when both groups had reached the age of 11.5 years. But this additional whole year of schooling between the ages of five and six is associated at age 11 years with less than 12 months additional points in reading score.

These findings are in conformity with the common sense notion that schooling is of value in the acquisition of reading skills, and is also in conformity with the common sense notion that a given quantity of organized school experience will advance reading skills more when applied at a later age in childhood than at an earlier age in childhood.

These findings throw no light on the question of how this extra year of schooling between the ages of 5 and 6 can best advance the reading skills of children. It simply provides us with additional evidence that this year of schooling can contribute materially to the ultimate level of reading skill achieved. One does not know enough about the conditions under which the schooling occurred in this population to draw any inferences about more and less desirable educational policy for the first year of school life. These data can be regarded as evidence that a year of school between 5 and 6 can, and, in this population in general did, lead to a higher level of reading skill at each age up to 12. Whether this advantage is maintained in later years cannot be determined from these data.

Entirely different types of studies would be required to secure more precise information as to the timing and type of school programs which facilitate reading achievement. It would be desirable to assign randomly half a group of five-year-

olds to begin schooling immediately and half to wait a year before starting, while assuring that the types of school experiences were comparable. More complex studies of this same type might investigate the effects of variations in the type and timing of reading instruction.

Summary

Over 3,000 unselected school children, grades 3–6, were given a reading achievement test and a non-verbal IQ test during a few weeks. Their scores are related to school entrance age and to chronological age. It was found that (1) those "retarded" in reading had a mean entrance age 5.3 months later than other children, (2) those who entered school younger scored higher on reading achievement at each chronological age and for each IQ group, (3) older children scored higher than younger children who had the same number of years of schooling.

It is concluded that, under the age of 12, children who have had more years of schooling (that is, entered school younger) have higher average reading ability than children of the same age who have had less schooling.

Reference

1. Cunningham, J. M.: Psychiatric Case Work as an Epidemiological Tool. *American Journal of Orthopsychiatry*, October, 1948, xviii, pp. 659–69.

MATERNAL AND NEWBORN NUTRITION STUDIES AT PHILADELPHIA LYING-IN HOSPITAL*

NEWBORN STUDIES. III. SIZE AND GROWTH OF BABIES DURING THE FIRST THREE MONTHS OF LIFE

RICHARD V. KASIUS,[1] ALEXANDER RANDALL, IV, M.D.,[2] WINSLOW T. TOMPKINS, M.D.,[3] AND DOROTHY G. WIEHL.[1]

ONE objective of the Study at the Nutrition Clinic of the Pennsylvania Hospital was to determine the effect of nutritional supplementation of the diets of pregnant women upon the physical condition at birth and on early growth of their babies. A previous report (1) has presented an analysis bearing upon this question with the conclusion that the effects of the supplements on size at birth and upon infant growth were negligible. That report was based upon the records of monthly physical examinations of the infants which contain an extensive amount of data relating to infant growth. Without reference to the specific nutritional supplements received by the mothers, this report will summarize the information on weight, length, and chest circumference during the first three months of life in greater detail than was necessary in the earlier analysis.

The present report is based on the records of 1,335 infants of mothers attending the Nutrition Clinic during the course of the study, 1947–1952. Babies weighing 5.5 lbs, or less were considered premature and have been excluded from this analysis, as have twins and infants of mothers with syphilis or a serious chronic disease.[4] Nine hundred eighty-eight of the babies were

* The Nutrition Studies at Pennsylvania Hospital (Philadelphia Lying-in Hospital) were supported by grants-in-aid from the Milbank Memorial Fund, the Williams-Waterman Fund, the National Vitamin Foundation, the Upjohn Company, E. R. Squibb and Sons, and in part by the Nutrition Foundation and Mead Johnson & Company.

[1] Milbank Memorial Fund.
[2] Formerly Pediatric Fellow, Nutrition Studies.
[3] Pennsylvania Hospital, Director of Nutrition Studies.

[4] Patients with chronic disease or syphilis referred to the Nutrition Research Clinic were carried but have been excluded from tabulations in this report. Chronic diseases excluded are essential hypertension, chronic heart classified II-a or higher, chronic nephritis, and chronic pyelitis.

white and 347 were Negro, and about 75 per cent of the white infants had one or both parents of Italian ancestry. While in the Hospital all infants were placed on the same regime, and the mothers were given uniform feeding instructions and vitamin supplements for their babies. The condition of the infants at birth was generally favorable, about two-thirds being appraised as good or excellent by the pediatricians and less than 3 per cent as poor.

Not all babies were brought back to the Clinic for each monthly examination, and the number of infants for whom measurements are available at two and three months of age is considerably less than the number with measurements at birth. This loss was greater for white infants, amounting to almost 50 per cent, than for Negroes among whom it was only 20 per cent. At birth a small group of babies were not measured for length and chest circumference so that the number of weight observations is somewhat larger than the number of measurements of the two body dimensions.

For various reasons, it was not possible, in many cases, to perform the examinations at exact monthly intervals. To achieve comparability of age, the measurements were adjusted to ages 30, 60, and 90 days by plotting the observations for each baby and making a linear interpolation or extrapolation from the day of measurement to the day on which it should have been made. In no case was this method used to provide observations when no examination had been done.

The measurements were made in a uniform manner and during much of the study were done by the same pediatrician (A.R.).[5] The infants were weighed nude on a scale measuring in units of pounds and ounces and the weight was read to the nearest ounce. The crown-sole length was measured with the baby placed flat and straight on a board and the measurement was made from the plane tangent to the top of the head to the bottom of the heels. The measurement of chest circumfer-

[5] Measurements not done by Alexander Randall, IV, M.D. were done by Josephine Perlingiero Randall, M.D., and Thomas R. Boggs, M.D.

ence was made with a steel tape at the level of the xiphoid, normal to the body axis. Both length and chest circumference were measured in centimeters to the nearest tenth. No information is available for estimating the amount of systematic error in the measurements; however, consideration of the procedures followed affords some estimate of the direction such error might take. Length is more likely to be underestimated than overestimated due to the difficulty of positioning the infant with the legs completely straight, while chest circumference may tend to be overestimated by measuring the infant when the chest is at the point of maximum expansion. It is less probable that systematic errors would enter into the determination of weight.

The mean values of weight, length, and chest circumference by race and sex at birth, and at one, two, and three months of age are given in Table 1 and Figure 1. The average weight for males is always larger than the mean for females of the same race, the difference between them increasing from about a quarter of a pound at birth to over a pound at three months of age. At birth this value for white males is 7.53 lbs. compared to 7.26 lbs. for white females, and 7.38 lbs. and 7.16 lbs. for Negro males and females respectively, while at three months the two means for white babies are 13.46 lbs. and 12.44 lbs. and for Negro infants, 13.51 lbs. and 12.42 lbs. There is little difference between the mean weight of white and Negro infants of the same sex at any of the four ages.

A similar pattern of small differences by race but relatively large differences by sex is noted for the means of length and chest circumference. The two groups of male infants averaged over 50 cms. in length at birth and a little more than 61 cms. at three months; the mean length of the female babies was around 49.5 cms. at birth and close to 60 cms. at three months. The differences between the means of length for the sex groups of the same race was .67 cms. at birth and over 1.10 cms. at ninety days. The mean chest circumference for white babies is larger than that for Negro infants of the same sex over the

Table 1. Mean weight, length, and chest circumference by age and by race and sex.

Race and Sex	Mean				Standard Error of Mean				Number			
	Birth	1 Month	2 Months	3 Months	Birth	1 Month	2 Months	3 Months	Birth	1 Month	2 Months	3 Months
	weight (lbs.)											
White Males	7.53	9.15	11.51	13.46	.04	.06	.08	.10	537	386	253	262
White Females	7.26	8.64	10.65	12.44	.04	.05	.07	.09	451	339	226	240
Negro Males	7.38	9.14	11.57	13.51	.08	.09	.10	.12	181	163	152	150
Negro Females	7.16	8.68	10.77	12.42	.07	.08	.12	.14	166	152	128	128
	length (cms.)											
White Males	50.30	54.46	58.02	61.02	.09	.11	.14	.14	510	384	251	262
White Females	49.64	53.56	56.96	59.91	.10	.10	.13	.14	397	335	227	241
Negro Males	50.07	54.27	58.06	61.17	.17	.18	.17	.18	164	164	153	151
Negro Females	49.39	53.35	56.94	60.02	.16	.16	.20	.21	149	152	129	129
	chest circumference (cms.)											
White Males	32.61	36.23	38.94	41.00	.07	.09	.11	.11	504	378	251	262
White Females	32.27	35.52	38.00	39.79	.08	.08	.10	.11	398	332	226	241
Negro Males	32.02	36.14	38.77	40.67	.15	.13	.13	.15	161	163	153	150
Negro Females	31.89	35.30	37.74	39.46	.14	.14	.15	.16	148	149	128	128

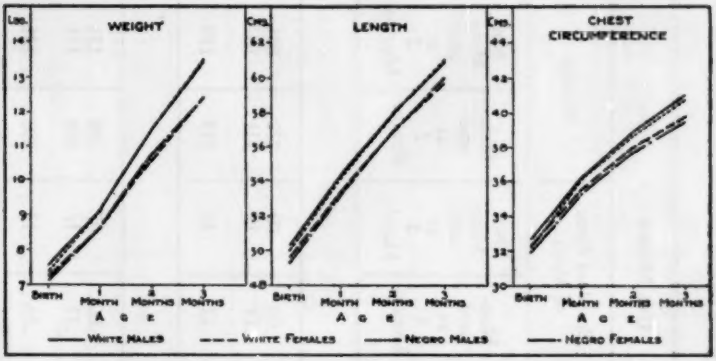


Fig. 1. Mean weight, length, and chest circumference by age and by race and sex.

entire period, but such differences are not as great as those between the means for male and female babies of the same race. At birth the mean values of this measurement vary from 31.89 cms. for Negro females to 32.61 cms. for white males, while the range at three months is from about 39.5 cms. to 41 cms. The difference between the means for the babies of each sex at birth is .34 cms. for white infants but only .13 cms. for Negro infants and at three months it is 1.21 cms. for both race groups.

At this point, it is appropriate to consider the possible bias introduced into the analysis by the depletion in the number of white infants on which the means at one, two, and three months are based. Birth measurements were made on those not brought to the Clinic at one month, and the means for this group at birth may be compared with the birth means for those measured at one month; similarly, the means at one month for those not seen at two months may be compared with those who were measured at that time (Table 2). Comparison of each pair of mean values suggests that the white male infants who were brought into the Clinic may have been somewhat heavier and longer than those not returned for examination. For example, the mean birth weight of those seen at one month was 7.56 lbs. compared to 7.49 lbs. for those not seen at thirty days. The

Table 2. Mean weight, length, and chest circumference at birth and one month for white infants classified by presence or absence of measurement at one month and two months.

Measurement	Birth						One Month					
	Mean		Standard Error of Mean		Number		Mean		Standard Error of Mean		Number	
	Measured at 1 Month	Not Measured at 1 Month	Measured at 1 Month	Not Measured at 1 Month	Measured at 1 Month	Not Measured at 1 Month	Measured at 2 Months	Not Measured at 2 Months	Measured at 2 Months	Not Measured at 2 Months	Measured at 2 Months	Not Measured at 2 Months
	WHITE MALES											
Weight (Lbs.)	7.56	7.49	.05	.08	386	151	9.20	9.07	.08	.09	222	164
Length (Cms.)	50.36	50.15	.11	.16	365	145	54.51	54.38	.14	.17	221	163
Chest Circumference (Cms.)	32.60	32.65	.09	.14	356	148	36.26	36.19	.12	.14	219	159
	WHITE FEMALES											
Weight (Lbs.)	7.23	7.37	.05	.10	339	112	8.63	8.66	.06	.07	205	134
Length (Cms.)	49.61	49.74	.11	.21	295	102	53.49	53.68	.13	.17	204	131
Chest Circumference (Cms.)	32.14	32.62	.08	.18	295	103	35.49	35.55	.10	.12	201	131

Table 3. Quartile values of weight, length, and chest circumference by age and by race and sex.

Race and Sex	Birth			One Month			Two Months			Three Months		
	1st Quartile	Median	3rd Quartile	1st Quartile	Median	3rd Quartile	1st Quartile	Median	3rd Quartile	1st Quartile	Median	3rd Quartile
	WEIGHT (LBS.)											
White Males	6.86	7.57	8.25	8.42	9.14	9.93	10.56	11.49	12.44	12.36	13.48	14.54
White Females	6.67	7.29	7.93	8.08	8.58	9.18	9.95	10.58	11.34	11.49	12.31	13.20
Negro Males	6.68	7.39	8.22	8.37	9.05	10.03	10.62	11.47	12.44	12.49	13.41	14.41
Negro Females	6.49	7.13	7.85	7.92	8.63	9.35	9.71	10.77	11.68	11.18	12.44	13.58
	LENGTH (CMS.)											
White Males	48.93	50.27	51.66	52.89	54.52	56.04	56.39	57.79	59.77	59.62	60.78	62.58
White Females	48.40	49.62	50.87	52.18	53.45	54.82	55.65	56.84	58.31	58.42	59.72	61.39
Negro Males	48.60	50.20	51.61	52.62	54.39	55.89	56.44	58.18	59.47	59.67	61.36	62.66
Negro Females	48.04	49.20	50.68	51.83	53.23	54.81	55.34	56.72	58.48	58.46	60.08	61.30
	CHEST CIRCUMFERENCE (CMS.)											
White Males	31.36	32.59	33.85	35.08	36.14	37.44	37.64	38.93	40.16	39.72	40.93	42.25
White Females	31.18	32.21	33.36	34.51	35.51	36.50	37.10	38.00	38.93	38.64	39.80	40.94
Negro Males	30.64	31.92	33.35	34.95	36.12	37.42	37.68	38.74	39.84	39.52	40.63	41.87
Negro Females	30.82	31.77	33.19	34.07	35.27	36.47	36.55	37.79	38.84	38.25	39.44	40.62

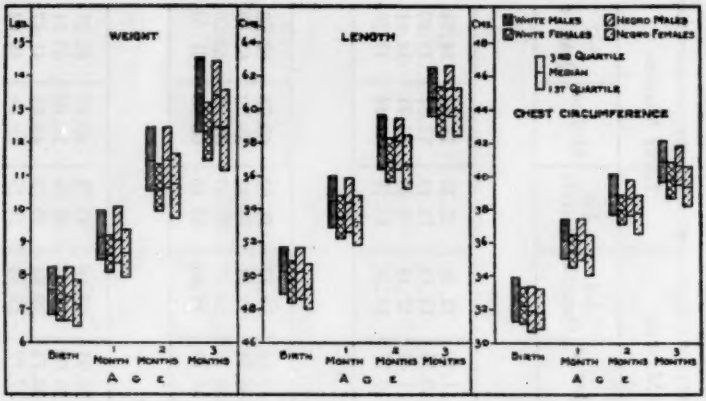


Fig. 2. Quartile values of weight, length, and chest circumference by age and by race and sex.

female infants brought to the Clinic may tend to be slightly lighter and smaller than those not returned. However, the differences between none of these means are statistically significant except that between the means for chest circumference at birth for females, but it should be kept in mind in making comparisons that the mean values for white males may be a little larger than would be found if measurements were available for the entire population of Clinic babies and those for white females may be a little smaller.

While comparing the mean values of the measurements of the infants in the four race-sex groups, it should not be forgotten that the means are derived from the distributions of the measurements, and that the four distributions for any measurement at a single age will overlap to a considerable extent. An indication of the extent of this overlapping is furnished by Table 3 and Figure 2, giving the quartile values of each distribution. As would be expected from the values of the means (Table 1), the distributions for all four groups are most similar for the measurements at birth. At each successive month of age the sex differences in growth become more apparent until at three months for each measurement the distribution for males

Race and Sex	Mean Gain During:			Standard Error of Mean			Number		
	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
	weight (lbs.)								
White Males	1.59	2.43	2.01	.03	.04	.04	386	222	212
White Females	1.41	2.04	1.81	.03	.04	.04	339	205	192
Negro Males	1.73	2.44	2.02	.05	.05	.05	163	143	142
Negro Females	1.55	2.05	1.75	.05	.05	.05	152	121	116
	length (cms.)								
White Males	4.27	3.58	3.03	.06	.07	.07	365	220	207
White Females	4.16	3.49	2.84	.06	.07	.07	295	204	193
Negro Males	4.26	3.74	3.19	.10	.09	.09	147	143	144
Negro Females	4.24	3.53	3.01	.10	.09	.10	137	121	115
	chest circumference (cms.)								
White Males	3.87	2.71	2.10	.08	.07	.07	356	219	208
White Females	3.46	2.47	1.97	.07	.07	.06	295	201	192
Negro Males	4.08	2.70	2.07	.12	.08	.07	145	143	143
Negro Females	3.70	2.58	1.79	.12	.09	.07	135	118	114

Table 4. Mean monthly gain in weight, length, and chest circumference by race and sex.

between the lower quartile value and the median corresponds roughly to the distribution for females of the same race between the median and the upper quartile value.

The average monthly gain in weight, length, and chest circumference during each of the first three months of life is shown in Table 4 and the mean percentage gain in each month in Table 5. The mean increase in weight is largest during the second month of life for all four race-sex groups. In this period the average gain is slightly over 2 lbs. for female babies and almost 2.5 lbs. for males. The gain in weight during the second month is also largest when expressed in relative terms (Table 5), being over 26 per cent for males and over 23 per cent for females. The smallest relative gain in weight is found during

Race and Sex	Mean Per Cent Gain During:			Standard Error of Mean		
	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
	WEIGHT					
White Males	21.1	26.3	17.4	.49	.47	.37
White Females	19.6	23.2	16.5	.49	.43	.33
Negro Males	23.7	26.7	17.3	.79	.64	.42
Negro Females	22.1	23.2	15.9	.82	.58	.46
	LENGTH					
White Males	8.5	6.6	5.2	.13	.11	.12
White Females	8.3	6.5	4.9	.14	.13	.13
Negro Males	8.5	6.8	5.4	.20	.15	.16
Negro Females	8.5	6.6	5.3	.21	.17	.19
	CHEST CIRCUMFERENCE					
White Males	11.9	7.4	5.0	.35	.20	.17
White Females	10.7	6.9	5.1	.24	.21	.17
Negro Males	12.9	7.4	5.1	.42	.24	.18
Negro Females	11.5	7.2	4.6	.40	.26	.19

Table 5. Mean monthly per cent gain in weight, length, and chest circumference by race and sex.

the third month, although the average weight gain in this period is larger than for the first month.

Gain in weight usually does not begin at birth, but follows a post-natal loss in weight to which most infants are subject in the first days after birth (Table 6). The average weight loss is about .5 lbs. for all race-sex groups, and the average percentage loss is between 6.2 and 6.5 per cent. The amount lost is related to the birth weight, the means for the babies who are lightest at birth lying between .40 and .46 lbs. compared to a range of .58 to .62 lbs. for the heaviest infants. The variation in weight loss within each birth weight class is large, however, and the coefficients of the correlation between birth weight and

Race and Sex	Mean Per Cent of Birth Weight Lost	Mean Weight Loss (Lbs.)				
		Total	Birth Weight (Lbs.)			
			5.6–6.5	6.6–7.5	7.6–8.5	8.6 and Above
White Males	6.2	.52	.40	.50	.54	.60
White Females	6.4	.51	.46	.50	.56	.60
Negro Males	6.5	.53	.45	.51	.59	.58
Negro Females	6.3	.49	.46	.48	.51	.62
	STANDARD ERROR OF MEAN					
White Males	.10	.01	.02	.01	.02	.02
White Females	.11	.01	.02	.01	.02	.03
Negro Males	.20	.02	.03	.02	.04	.04
Negro Females	.23	.02	.03	.02	.04	.08
	NUMBER					
White Males	530		79	193	168	90
White Females	443		100	186	121	36
Negro Males	180		41	65	48	26
Negro Females	166		49	65	38	14

Table 6. Mean weight loss after birth by birth weight and race and sex.

weight loss are between .17 and .29 (Table 7). The percentage loss in weight after birth is unrelated to the birth weight, the

Table 7. Correlation between birth weight and weight loss after birth by race and sex.

Race and Sex	Correlation Between Birth Weight and:		Number
	Weight Loss	Per Cent of Birth Weight Lost	
White Males	.27	−.01	530
White Females	.26	−.06	443
Negro Males	.29	−.03	180
Negro Females	.17	−.07	166

Race and Sex	Gain from Minimum Weight to Weight at One Month			Per Cent Gain from Minimum Weight to Weight at One Month	
	Mean (Lbs.)	Standard Error of Mean	Number	Mean	Standard Error of Mean
White Males	2.05	.03	386	29.1	.51
White Females	1.87	.03	339	27.8	.51
Negro Males	2.23	.05	163	32.3	.82
Negro Females	2.00	.05	152	30.3	.85

Table 8. Mean weight gain from postnatal minimum to one month of age by race and sex.

correlation between these two observations ranging from – .01 to – .07. The last day of age on which the minimum weight was observed before gain in weight was established ranged from the day of birth up to ten days, but for most infants was one, two, or three days after birth. The median day of minimum weight for all race-sex groups was 2.8 days.

If the gain in weight during the first month is measured from the minimum weight, the mean gains for white babies are about equal to those during the third month and those for Negro babies approach the values for the second month (Table 8). Since the gain from the minimum to one month occurs during a period of time several days shorter than the thirty days over which the gain during the second month is measured, it appears that the average daily increase in weight is much the same during these two intervals. The mean per cent increase from the minimum weight to the weight at one month exceeds the percentage increase in the second month, ranging from almost 28 per cent for the white female infants to over 32 per cent for the Negro males.

For both measurements of body size the maximum average gain is found during the first month of life, when computed on either an absolute or relative basis, and growth decreases in each of the following months. In the first month the mean

increase in length is around 4.25 cms., declining to between 3.50 and 3.75 cms. during the second month, and dropping to about 3 cms. during the third month. During none of the monthly intervals is there much difference among the race-sex groups in the means of per cent increase in length. The means during the first month are between 8.3 and 8.5 per cent and between 4.9 and 5.4 per cent during the third month. The mean increase in chest circumference during the first thirty days of life varies from 3.5 cms. to slightly above 4.0 cms., dropping to around 2 cms. during the third month. In relative terms, the corresponding gains are between 10.5 and 13.0 per cent in the first month and around 5 per cent during the third.

Table 9. Mean gain in weight, length, and chest circumference between birth and one month, two months, and three months of age by race and sex.

Race and Sex	Mean Gain from Birth to			Standard Error of Mean		Number	
	1 Month	2 Months	3 Months	2 Months	3 Months	2 Months	3 Months
	WEIGHT (LBS.)						
White Males	1.59	3.99	5.98	.06	.08	253	262
White Females	1.41	3.39	5.19	.06	.07	226	240
Negro Males	1.73	4.11	6.12	.08	.10	152	150
Negro Females	1.55	3.56	5.23	.10	.12	128	128
	LENGTH (CMS.)						
White Males	4.27	7.77	10.79	.09	.09	232	244
White Females	4.16	7.51	10.29	.10	.10	185	203
Negro Males	4.26	8.00	11.09	.13	.15	135	133
Negro Females	4.24	7.70	10.81	.13	.17	113	114
	CHEST CIRCUMFERENCE (CMS.)						
White Males	3.87	6.68	8.69	.10	.12	229	240
White Females	3.46	5.98	7.72	.11	.12	185	202
Negro Males	4.08	6.78	8.67	.15	.18	133	131
Negro Females	3.70	6.19	7.79	.16	.18	110	112

The mean gains from the measurement at birth to each of the subsequent monthly measurements are given in Table 9 and the corresponding percentage gains in Table 10 and Figure 3. At three months of age the babies have, on the average, gained between 5 and 6 lbs. in weight, increased in height between 10 and 11 cms.; and in chest circumference between 7¾ and 8¾ cms. The relative gain in weight during this period is greater for males (over 80 per cent) than for females (over 72 per cent), and the Negro babies on the average gain weight more rapidly during this period than do white infants of the same sex. The mean per cent increase in length is much more constant among the four race-sex groups, lying between 15 and 16 per cent at two months, and between 20.6 and 22.3 per cent

Table 10. Mean per cent gain in weight, length, and chest circumference between birth and one month, two months, and three months of age by race and sex.

Race and Sex	Mean Per Cent Gain from Birth to:			Standard Error of Mean	
	1 Month	2 Months	3 Months	2 Months	3 Months
	WEIGHT				
White Males	21.1	53.7	80.5	.96	1.25
White Females	19.6	46.9	72.0	.95	1.24
Negro Males	23.7	56.7	83.7	1.36	1.83
Negro Females	22.1	49.7	74.4	1.51	1.99
	LENGTH				
White Males	8.5	15.4	21.5	.21	.20
White Females	8.3	15.3	20.6	.21	.22
Negro Males	8.5	16.0	22.3	.28	.35
Negro Females	8.5	15.6	21.8	.31	.38
	CHEST CIRCUMFERENCE				
White Males	11.9	20.5	27.1	.35	.41
White Females	10.7	18.6	24.1	.38	.44
Negro Males	12.9	21.4	27.3	.56	.65
Negro Females	11.5	19.4	24.5	.59	.67

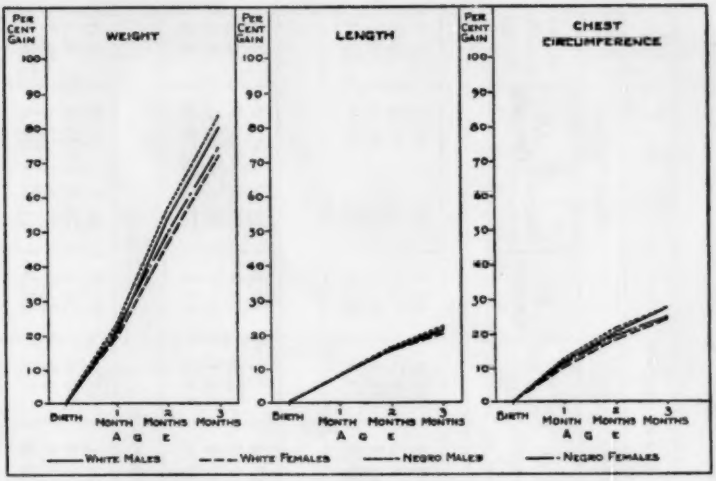


Fig. 3. Mean per cent gain in weight, length, and chest circumference between birth and 1 month, 2 months, and 3 months of age by race and sex.

at three months. The variation among the means of per cent increase in chest circumference is not large, but a tendency toward more rapid growth among the males is clear over the entire period.

The extent of the differences among the individual infants in percentage gain from birth to each month of age is indicated for each measurement by the quartile values (Table 11 and Figure 4). The widest diversity in relative increase over each of the three intervals was found for weight, and the least variation was noted for length. The interquartile ranges i.e., the difference between the third and first quartile values, are between 11 and 15 per cent for weight during the first month, between 2.7 and 3.2 per cent for length, and between 5.1 and 7.5 per cent for chest circumference. For the period from birth to three months the interquartile ranges are over 25 per cent for weight, under 5 per cent for length, and over 8 per cent for chest circumference. The tendency of male infants to grow more rapidly in weight and chest circumference than females is again illustrated by the higher quartile values noted for this

Table 11. Quartile values of per cent gain in weight, length, and chest circumference between birth and one month, two months, and three months of age by race and sex.

Race and Sex	Per Cent Gain Between Birth and:											
	One Month				Two Months				Three Months			
	1st Quartile	Median	3rd Quartile	Inter-quartile Range	1st Quartile	Median	3rd Quartile	Inter-quartile Range	1st Quartile	Median	3rd Quartile	Inter-quartile Range
	WEIGHT											
White Males	14.0	20.3	28.0	14.0	43.2	53.2	63.8	20.6	66.8	79.1	92.5	25.7
White Females	13.7	19.4	25.2	11.5	37.5	46.4	56.2	18.7	58.8	71.2	84.4	25.6
Negro Males	16.0	23.3	30.4	14.4	44.3	56.2	67.5	23.2	66.2	83.1	98.9	32.7
Negro Females	16.0	21.8	28.2	12.2	39.2	50.2	58.8	19.6	60.0	73.2	89.0	29.0
	LENGTH											
White Males	6.7	8.5	9.9	3.2	13.2	15.4	17.4	4.2	19.2	21.5	23.6	4.4
White Females	6.7	8.2	9.8	3.1	13.1	15.4	17.3	4.2	18.5	20.4	22.7	4.2
Negro Males	7.1	8.0	9.8	2.7	13.7	16.0	17.8	4.1	19.7	22.2	24.3	4.6
Negro Females	6.8	8.1	9.8	3.0	13.2	15.4	17.6	4.4	19.3	21.8	24.1	4.8
	CHEST CIRCUMFERENCE											
White Males	8.5	11.7	15.1	6.6	16.9	20.5	24.1	7.2	22.5	26.5	31.5	9.0
White Females	8.1	10.6	13.2	5.1	15.2	18.3	21.8	6.6	20.0	24.0	28.1	8.1
Negro Males	9.0	12.6	16.5	7.5	17.0	21.6	25.9	8.9	21.7	27.4	32.4	10.7
Negro Females	8.0	10.9	14.5	6.5	14.9	18.8	23.2	8.3	19.6	23.6	28.9	9.3

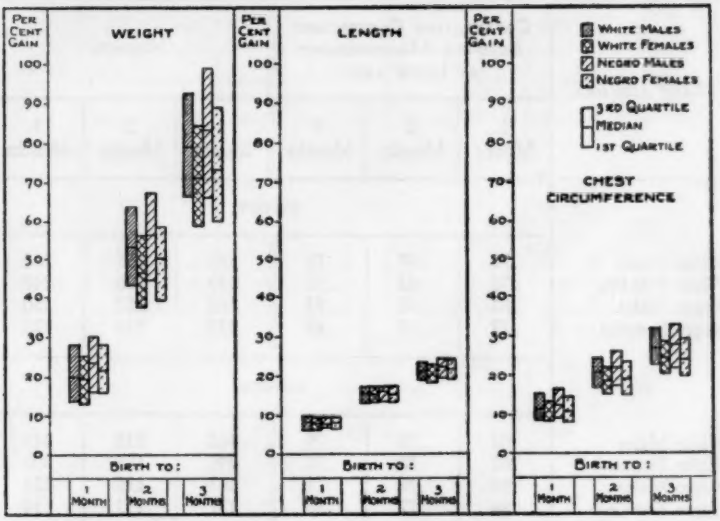


Fig. 4. Quartile values of per cent gain in weight, length, and chest circumference between birth and 1 month, 2 months, and 3 months of age by race and sex.

group during the two- and three-month intervals. In contrast, relative growth in stature during this period of life seems to be little influenced by either race or sex.

Another suggestion of individual differences in growth patterns is furnished by the coefficients of correlation between the values of each measurement at birth and the values at one, two, and three months (Table 12). For each measurement the closest association is found between the values at birth and one month. The highest coefficients between these two values are found for length, ranging from .81 for white females to .88 for Negro males; the corresponding set of correlations for weight are between .76 and .81, while for chest circumference the range of the coefficients is from .62 to .79. The coefficients between the values at birth and at two and three months for weight and chest circumference are successively lower, falling between .49 and .58 for weight for the three-month comparison and between .41 and .46 for chest circumference. In contrast, these correlations for length decrease very little from those between

Race and Sex	Correlation Coefficient Between Measurement at Birth and:			Number		
	1 Month	2 Months	3 Months	1 Month	2 Months	3 Months
	WEIGHT					
White Males	.78	.67	.58	386	253	262
White Females	.76	.63	.55	339	226	240
Negro Males	.81	.65	.55	163	152	150
Negro Females	.77	.55	.49	152	128	128
	LENGTH					
White Males	.84	.79	.79	365	232	243
White Females	.81	.78	.76	295	185	202
Negro Males	.88	.78	.73	147	135	133
Negro Females	.84	.77	.80	137	113	114
	CHEST CIRCUMFERENCE					
White Males	.64	.58	.46	356	229	240
White Females	.62	.57	.41	295	185	203
Negro Males	.79	.52	.43	145	133	131
Negro Females	.72	.49	.44	135	110	112

Table 12. Correlation between birth measurements and subsequent monthly measurements of weight, length, and chest circumference by race and sex.

the measurements at birth and thirty days. From this it would appear that the pattern of growth in length is established at birth to a greater extent than is increase in weight or chest circumference, and is possibly less influenced by environmental conditions during infancy than are the other two measurements.

The increase in a baby's measurement during the three-month period may be resolved into the increments of growth during each month. The correlations between these monthly increments afford some indication of the regularity of individual growth from month to month (Table 13). If relatively large or small increases in one month were associated with large

Race and Sex	Correlation Between Gains in:				Number			
	1st and 2nd Months	2nd and 3rd Months	1st and 3rd Months	1st Two Months and 3rd Month	1st and 2nd Months	2nd and 3rd Months	1st and 3rd Months	1st Two Months and 3rd Month
	WEIGHT							
White Males	.08	.37	−.05	.20	222	195	195	212
White Females	.21	.35	.03	.24	205	181	181	192
Negro Males	.23	.48	−.02	.25	143	135	135	142
Negro Females	.42	.44	.30	.44	121	110	110	116
	LENGTH							
White Males	−.15	−.14	−.08	−.24	204	193	180	191
White Females	−.15	−.23	.03	−.19	166	183	149	156
Negro Males	−.15	.05	−.05	−.15	127	136	120	126
Negro Females	−.04	−.11	.08	−.01	107	109	96	100
	CHEST CIRCUMFERENCE							
White Males	−.20	.09	−.10	−.03	200	192	176	189
White Females	−.21	.07	−.02	.04	166	179	149	156
Negro Males	.05	.18	−.08	.04	125	135	118	124
Negro Females	.21	.14	.11	.18	104	106	94	98

Table 13. Correlation between gains during each month for weight, length, and chest circumference by race and sex.

or small increases in another month, the correlation between the two sets of increments would be high. Actually, it may be seen that the correlation coefficients are, for the most part, quite low, indicating little consistency among the increments from month to month. The highest correlations are found between weight increments in the second and third months, ranging from .35 to .48. The negative correlations between the monthly gains in length, although low, suggest a tendency for large increases in one month to be followed by relatively small increases in the next interval.

It was thought that the increments of growth during the first two months of life might be more highly correlated with those during the third month than were the increases for either of

Table 14. Mean weight by birth weight, age, and race and sex.

Birth Weight	Mean Weight (Lbs.)				Standard Error of Mean			Number		
	Birth	1 Month	2 Months	3 Months	1 Month	2 Months	3 Months	1 Month	2 Months	3 Months
	WHITE MALES									
8.6 Lbs. and Above	9.11	10.46	12.83	14.86	.09	.17	.23	70	39	42
7.6–8.5 Lbs.	7.96	9.50	11.92	13.88	.07	.12	.15	122	86	85
6.6–7.5 Lbs.	7.01	8.76	11.09	13.16	.06	.10	.12	136	91	93
5.6–6.5 Lbs.	6.13	7.74	10.18	11.88	.09	.15	.21	58	37	42
	WHITE FEMALES									
8.6 Lbs. and Above	9.11	10.10	12.31	14.00	.13	.23	.21	27	16	20
7.6–8.5 Lbs.	7.98	9.22	11.20	13.29	.08	.13	.17	82	63	57
6.6–7.5 Lbs.	7.06	8.45	10.45	12.09	.04	.07	.09	155	95	110
5.6–6.5 Lbs.	6.10	7.91	9.83	11.67	.07	.13	.16	75	52	53
	NEGRO MALES									
8.6 Lbs. and Above	9.07	10.65	12.93	14.86	.15	.20	.27	24	23	22
7.6–8.5 Lbs.	8.04	9.71	12.17	14.17	.09	.14	.17	45	42	42
6.6–7.5 Lbs.	7.06	8.87	11.11	13.07	.08	.12	.18	60	57	54
5.6–6.5 Lbs.	6.04	7.83	10.53	12.44	.11	.13	.16	34	30	32
	NEGRO FEMALES									
8.6 Lbs. and Above	9.14	10.43	12.19	13.81	.26	.35	.46	11	13	13
7.6–8.5 Lbs.	8.00	9.41	11.27	12.91	.14	.23	.26	35	31	29
6.6–7.5 Lbs.	7.03	8.62	10.78	12.58	.08	.14	.21	60	47	48
5.6–6.5 Lbs.	6.13	7.82	9.82	11.37	.11	.18	.22	46	37	38

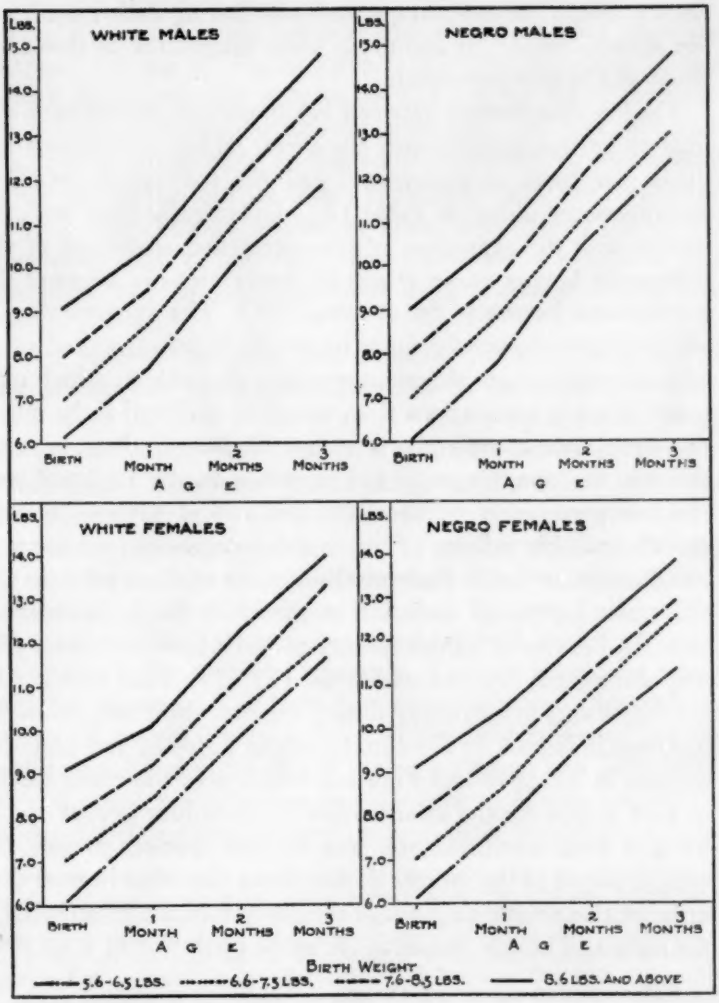


Fig. 5. Mean weight by birth weight, age, and race and sex.

these two months considered separately, but this was generally found not to be true. The departures of the correlations for Negro females from the patterns of the other race-sex groups should be noted, but their causes are not known. The correla-

tions between the percentage increases during each month are not shown, but are of about the same magnitude as those between the actual increments.

The low correlations between increments of growth may appear to be inconsistent with the much higher correlations between the birth measurements and the subsequent monthly measurements given in Table 12. Algebraically they are consistent with the expression of the correlation coefficient of the differences between several sets of observations in terms of the correlations between the observations.[6] The increments are affected proportionately more by errors in measurement or in adjustment than are the measurements themselves, which may result in lower correlations than would be observed if the measurements were completely accurate. However, absolute regularity in the complex process of growth is hardly expected, and the low correlation between the amount of growth in each month probably reflects to considerable degree the existence of small irregularities in the growth patterns of these infants.

Despite individual variation in growth, it has been observed that the heavier or lighter infants at birth tend to remain that way during infancy and childhood (2) (3). That this is true for the infants in this study during the first three months of life has been indicated by the correlations in Table 12 and may also be seen in Table 14 and Figure 5, which give the mean weight at each period for the infants classified into four groups on the basis of their birth weights. For all four race-sex groups, the weight curves of the infants lie one above the other in ascending order of their birth weights. A comparison of the mean weights for male and female babies in the same birth weight class illus-

[6] This expression is:

$$r_{(2-1)(3-2)} = \frac{r_{23}s_2s_3 + r_{12}s_1s_2 - r_{12}s_1s_3 - s_2^2}{\sqrt{(s_2^2 + s_1^2 - 2r_{12}s_1s_2)\,(s_3^2 + s_2^2 - 2r_{23}s_2s_3)}}$$

where $r_{(2-1)(3-2)}$ is the correlation between the increments from period 1 to period 2 and from period 2 to period 3; r_{12}, r_{23} and r_{13} are the correlations between the observations at the three periods; and s_1, s_2 and s_3 are the standard deviations of the observations at each period.

trates the tendency toward more rapid growth among the males. For example, the mean weight of white infants weighing between 7.6 and 8.5 lbs. at birth is 9.50 lbs. for males at one month compared with a mean of 9.22 lbs. for white females; for Negro babies the corresponding averages are 9.71 and 9.41 lbs. The only exception to this pattern is found at one month of age among the lightest group of infants; here, the means for females either slightly exceed or about equal those for males, suggesting that among the males whose birth weight is this low there may be a number who have difficulty establishing normal growth.

In a previous report in this series (1), it was found that if the babies were grouped on the basis of the degree to which their mothers were overweight or underweight before pregnancy, the average birth weight was largest for babies born to overweight mothers and lowest for those of mothers most underweight, with a steady decrease in the mean weights of the groups between these extremes. To see to what extent this relationship persisted through the next three months, the average weight of the infants classified by pregravid weight status of the mother[7] was computed for each period of measurement (Table 15 and Figure 6). First, it should be noted that the relationship at birth between weight and the mother's pregravid weight status is not completely established for the white females and the Negro males, although the differentiation in average weight between the infants of overweight and underweight mothers is clear.[8] In both male groups, the infants

[7] Patients were carefully questioned in the Clinic as to their immediate pregravid weight and were measured for height without shoes. The standard weight for a specific height and age used is from the Report of the Medico-Actuarial Investigation 1912–1914 up to age 25 years. The average weight at 25 years is extended to older ages and the value used is the mid-point of the weight range for women of medium frame published by the Metropolitan Life Insurance Company.

[8] The exclusion of all infants weighing 5.5 lbs. or less at birth regardless of period of gestation tends to minimize the differences between averages of birth weights for babies born to mothers in the different pregravid weight status groups. Although the number of full-term babies excluded is very small, more female than male babies are excluded and proportionally more are excluded as the mothers' weight status decreases. Of 19 babies weighing 5.1 to 5.5 lbs. but delivered at term, 7 were males and 12 were females, and only 1 was delivered to a mother 5 per cent or more overweight (4).

Table 15. Mean weight by mother's pregravid weight status, age, and race and sex.

Mother's Pregravid Weight Status	Mean Weight (Lbs.)				Standard Error of Mean				Number			
	Birth	1 Month	2 Months	3 Months	Birth	1 Month	2 Months	3 Months	Birth	1 Month	2 Months	3 Months
	WHITE MALES											
Overweight 15 Per Cent or More	7.91	9.58	11.98	14.14	.11	.14	.20	.27	100	73	44	45
Overweight 5–14 Per Cent	7.61	9.23	11.64	13.58	.10	.13	.18	.22	104	75	44	49
Within 5 Per Cent of Normal	7.57	9.15	11.46	13.36	.07	.10	.15	.16	169	122	81	87
Underweight 5–14 Per Cent	7.38	9.03	11.43	13.43	.09	.11	.15	.21	113	78	59	55
Underweight 15 Per Cent or More	6.88	8.41	10.72	12.38	.10	.17	.26	.25	45	35	23	24
	WHITE FEMALES											
Overweight 15 Per Cent or More	7.45	8.96	10.85	12.92	.10	.11	.19	.20	99	71	48	55
Overweight 5–14 Per Cent	7.49	8.63	10.50	12.41	.10	.13	.18	.20	76	55	43	47
Within 5 Per Cent of Normal	7.35	8.71	10.93	12.57	.07	.08	.13	.15	136	106	70	75
Underweight 5–14 Per Cent	6.91	8.37	10.17	11.98	.08	.08	.13	.15	95	67	40	40
Underweight 15 Per Cent or More	6.92	8.41	10.46	11.85	.11	.12	.15	.16	45	40	25	23
	NEGRO MALES											
Overweight 15 Per Cent or More	7.94	9.78	12.29	14.38	.16	.18	.21	.26	38	36	33	34
Overweight 5–14 Per Cent	7.45	9.24	11.55	13.44	.16	.17	.18	.18	42	38	39	34
Within 5 Per Cent of Normal	7.18	9.04	11.47	13.29	.17	.17	.20	.23	45	38	37	39
Underweight 5–14 Per Cent	7.12	8.88	11.17	13.07	.12	.15	.18	.24	40	36	30	30
Underweight 15 Per Cent or More	7.13	8.29	10.96	13.04	.26	.25	.35	.43	16	15	13	13
	NEGRO FEMALES											
Overweight 15 Per Cent or More	7.53	8.87	10.88	12.47	.17	.16	.22	.29	42	39	32	32
Overweight 5–14 Per Cent	7.36	8.92	11.00	12.90	.17	.22	.28	.33	26	24	20	20
Within 5 Per Cent of Normal	7.17	8.77	11.05	12.74	.14	.16	.24	.25	41	37	31	33
Underweight 5–14 Per Cent	6.94	8.77	10.67	12.35	.14	.18	.25	.32	36	34	29	26
Underweight 15 Per Cent or More	6.59	7.70	9.88	11.26	.13	.17	.31	.37	21	18	16	17

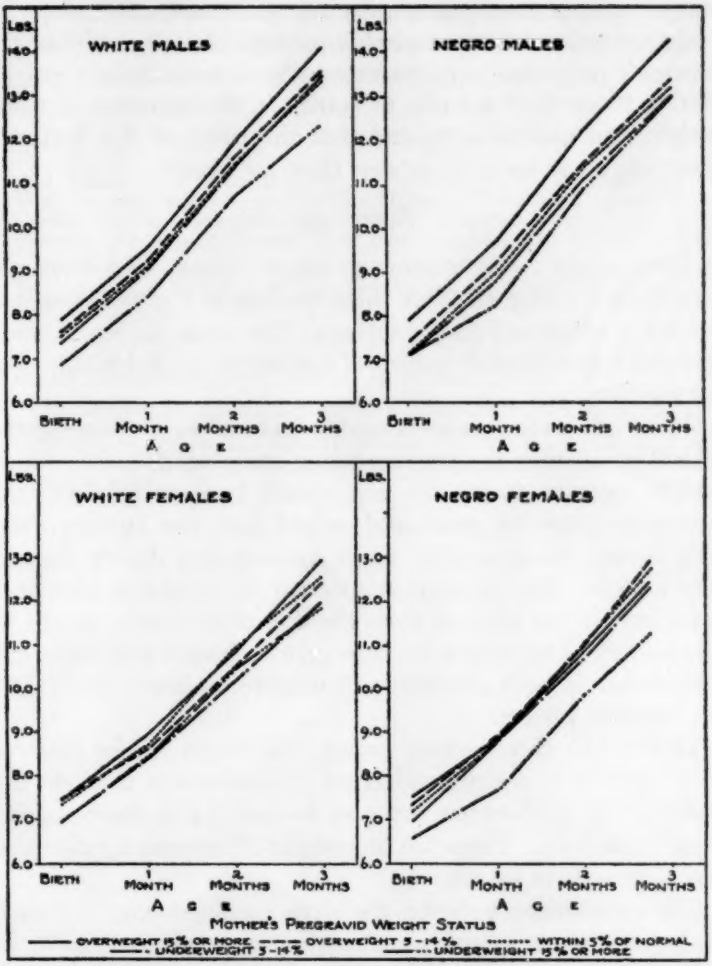


Fig. 6. Mean weight by mother's pregravid weight status, age, and race and sex.

of the most overweight mothers are, on the average, heavier than the other babies over the first three months of life, and, except for the white females, the babies of the most underweight mothers tend to be lightest. The differences in mean

weight among the other groups are small and, in the two female groups, not in a consistent pattern. It appears that the mother's pregravid weight status influences the baby's weight during these three months primarily at the extremes of overweight and underweight, and that the effect of this factor is more apparent for male infants than for female.

Summary

Data on the measurements of weight, length, and chest circumference during the first three months of life are presented for 1,335 white and Negro infants. The mean values of these measurements at each month of age are larger for males than for females.

The maximum average monthly gain in weight during the first three months is observed during the second month, but if weight increase during the first month is measured from the minimum after the post-natal weight loss, the average daily gain during this interval is about equal to that during the second month. The percentage increase in weight is also at a maximum in the interval from the day of minimum weight to one month. The largest average gain in length and chest circumference in both absolute and relative measure occurs during the first month.

During the three-month period, the Negro babies increase more rapidly in weight and chest circumference than do the white babies of the same sex, and the males gain more rapidly than the females. There are only slight differences by race and sex in growth in length.

The correlations between the birth measurements and each of the subsequent monthly measurements are given. The highest correlations are found between the measurements at birth and one month (.62 to .88) and the lowest between those at birth and three months (.41 to .58 for weight and chest circumference and .73 to .80 for length). The correlations between the increments of growth for each measurement during each month are considerably lower (−.25 to .48).

Material illustrating the relationship between birth weight and subsequent weight, and between the mother's pregravid weight status and the infant's weight is presented.

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A SURVEY OF HEALTH AND DEMOGRAPHIC ASPECTS OF REPORTED FEMALE STERILIZATIONS IN FOUR HEALTH CENTERS OF SHIZUOKA PREFECTURE, JAPAN

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SINCE the passage of the Eugenic Protection Law in 1948 the number of sterilization operations has increased year by year. The number officially reported was 11,403 in 1950, 16,233 in 1951, 22,424 in 1952, and 32,552 in 1953.[1] The actual number of operations performed is difficult to estimate; it may amount to five or ten times the reported number.

The female sterilizations already performed have been sufficient to have a marked effect on birth in future years. The number of operations performed in the years from 1949 to 1953 is sufficient to reduce the number of women in the child-bearing age in the year 1960 by 71,881.[2] Assuming that the average age at the time of sterilization was approximately 30 and that the future fertility would have followed the current trends among Japanese women, the loss of future births from the 72 thousand women would be about 140 thousand. If we assume that actual sterilizations are five times the reported number, the loss of fertile women by 1960 would amount to about 360 thousand, the loss of anticipated births 700 thousand. If actual

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[1] Practically all of these operations, 98 to 99 per cent of the total, are performed on females.

[2] The computations were made on the assumption that the age distributions of women found in the present study were applicable to all Japan.

sterilizations are ten times the reported number, the losses would amount to 719 thousand for fertile women and 1.4 million for births. These, it should be noted, are the anticipated consequences only of the sterilizations that have already occurred between 1949 and 1953. Since sterilizations may well continue from 1954 to 1960, total reductions in live births associated with the sterilization of women may assume major proportions by the year 1960.

The Present Study

Sterilizations, as induced abortions, are performed in accordance with the provisions of the Eugenic Protection Law of 1948. According to this law as amended through May, 1954, there are three categories of sterilizations: (1) Compulsory sterilization performed for psychiatric and eugenic reasons (Article 4); (2) sterilization performed on patients with non-hereditary mental diseases or feeble-mindedness (Article 12); (3) sterilization performed by a physician designated under the Law, with the consent of the person in question and the spouse, in cases where the person in question, the spouse or a relative has a hereditary disease, mental disease or feeble-mindedness, or leprosy, or in cases where "pregnancy or delivery might endanger the life of the mother" or "the mother already has several children and the delivery might markedly injure the health of the mother" (Article 3). In practice, there have been few sterilizations performed under the first and second provisions. Compulsory sterilizations numbered only 273 in 1950, 480 in 1951, 560 in 1952, and 832 in 1953. The great majority of the sterilizations, 97 to 98 per cent of the total, have been performed under the third provision. And within this category most operations are performed for reasons relating to the health of the mother. It is widely believed that the real reasons are socio-economic. In Japan today, sterilizations, as abortions, are performed as a means of family limitation. As between the two means, it is apparent that sterilization is the more definitive means.

The increasing importance of the performance of sterilization and the almost complete absence of any information beyond the reports collected by the Government led to the decision to make a field study. In order to secure some comparability in results, it was decided to make this initial study of sterilization in Shizuoka Prefecture where a field study of abortions had already been made.[3]

The planning for the survey was completed in April, 1953, and the personal interviews were made from June to September, 1953 in four areas in Shizuoka Prefecture—Shizuoka, Hamamatsu, Numazu and Yoshiwara Health Center Districts—with the cooperation of the Shizuoka Prefectural Health Department. The interviews were conducted by Drs. M. Muramatsu and S. Agata of the Department of Public Health Demography, Institute of Public Health.

The women included in the survey were those living in the four Health Center Districts who were reported as having had a sterilization operation performed between April 1, 1952 and March 31, 1953, under Article 3 of the Eugenic Protection Law (voluntary sterilization). Reported sterilization operations in these areas performed on women living outside the areas were excluded because of the difficulty of locating the women concerned. The average time required for each interview was 30 to 40 minutes. In general, the cooperation of the women was excellent. The total number of cases was 428, the final number of satisfactory returns 338, or 79 per cent. Unknown addresses and out-movement made it impossible to locate some women. The major obstacle was the fact that the Law did not specifically require a detailed address in the reporting of the operation. Most of the interviews were made in the homes, though some were made in the Health Center.

The chief reason for the choice of Shizuoka Prefecture was the interest of the Prefectural Health Department in sterilization and conception control and its willingness to cooperate in

[3] The publications of the results of this study of abortions are cited in the bibliography.

the study. The four Health Centers were located in cities between 30,000 and 250,000 in population as of 1950. Each Health Center served both the city and the surrounding rural area. Shizuoka Prefecture itself is slightly above the average among all prefectures of Japan with respect to economic conditions.

The following items were included in the questionnaire: (1) General information about socio-economic conditions in the family such as education of the parents, ability to live within income, etc.; (2) number of past pregnancies and their outcome; (3) number of living children and their sex; (4) health conditions before and after the operation; (5) circumstances under which the operation was performed and the cost; (6) practice of contraception prior to the operation.

Characteristics of the Households

The proportion of husbands and wives who had some education beyond the elementary level was slightly higher in the sterilization study than in the abortion study. (Table 1.) Moreover, as compared with the abortion group, the economic

Table 1. Educational status of couples surveyed.

Educational Status	Sterilization Study				Abortion Study	
	Husband		Wife		Husband	Wife
	Number	Per Cent	Number	Per Cent	Per Cent	Per Cent
Graduates from University or College	43	12.7	6	1.8	13.1	3.8
Graduates from Middle School	[a]98	29.1	[c]116	34.4	23.6	30.7
Graduates from Elementary School	196	58.2	215	63.8	63.8	65.5
Total	[b]337	100.0	[d]337	100.0	100.0	100.0

[a] Includes one husband who left middle school halfway.
[b] There is one other husband who had no schooling.
[c] Includes two wives who left middle school halfway.
[d] There is one other wife whose record was not known.

Status of Household Financing	Sterilization Study		Abortion Study
	Number	Per Cent	Per Cent
Surplus	74	22.0	8.8
Balance	172	51.0	48.0
Deficit	84	24.9	40.7
On Relief	7	2.1	2.5
Total	[1]337	100.0	100.0

[1] There is one other household for which no information was available.

Table 2. Status of household financing.

status of the sterilization group was somewhat higher. It is difficult to measure this factor directly, for there was an improvement in the economic status of the national population between the dates of the two studies. An indirect measure is used here—the presence of surplus, balance, or deficit in the household financing. For the nation as a whole, this is related to economic status, the upper socio-economic groups tending to reveal surpluses, the lower groups, deficits. As the data of Table 2 show, the households of the sterilization group had far higher proportions of families with surpluses and far fewer with deficits than did those in the abortion study. This finding, together with that concerning educational status, indicates that in this area of Japan reported sterilizations tended to represent households of higher social and economic levels than re-

Table 3. Occupations of husbands at the time of the sterilization operation.

Occupation	Number	Per Cent
Public Service, Company Employees, Clerks	79	23.4
Commerce	63	18.6
Factory Workers	61	18.1
Agriculture, Fishing	46	13.6
General Service Occupations	43	12.7
Physicians, Teachers, Lawyers, Priests	22	6.5
Manufacturing Industries	17	5.0
Others	3	0.9
No Occupation	4	1.2

ported abortions. When the cost of sterilization and the time required for hospitalization are considered, this difference seems quite natural. It should be noted, however, that it cannot be taken to mean that it was women of the upper social and economic groups who preferred sterilization. Women from low income groups might wish sterilization but find the cost prohibitive.

As would be anticipated from the location of the Health Centers surveyed and the characteristics of the households, the husbands of the women who were sterilized were engaged primarily in occupations other than agriculture. (Table 3.) The proportion engaged in agriculture or fishing was approximately one-third that for men in Japan as a whole. On the other hand, service occupations and commerce were relatively 1.5 times more numerous than in Japan as a whole. The proportion of "white-collar" occupations was quite large. No one engaged in forestry or mining was included in the present survey.

The Demographic Basis for Sterilization

The age distribution of the wives who had been sterilized is given in relation to that of their husbands in Table 4. There were rather significant differences in the age composition of the wives who had had sterilizations and those in the previous

Table 4. Ages of husbands and wives at the time of the sterilization of the wife.

Husband / Wife	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	Not Stated	Total	Per Cent
20–24	1	5	1	1						8	2.4
25–29		9	36	23	1		1			70	20.7
30–34			33	76	21	4		2		136	40.2
35–39				25	59	18	3	1	1	107	31.7
40–44				1	6	7	3			17	5.0
Total	1	14	70	126	87	29	7	3	1	338	100.0
Per Cent	0.3	4.1	20.7	37.3	25.7	8.6	2.1	0.9	0.3	100.0	

study who had had abortions. The following percentages reveal the differences:

Age of Wife	*Sterilization Study*	*Abortion Study*
Below 30	23.1	31.6
30–34	40.2	28.1
35–39	31.7	26.7
40 and Above	5.0	13.6

In the group which had been sterilized, both the proportion of women who were under 30 years of age, and the proportion who were in their forties, were lower than in the group which had had an induced abortion. Wives aged 30 to 39 years comprised more than 70 per cent of those who had been sterilized. In the women in their thirties, the difference between these two groups was especially great in those aged 30 to 34.

The proportion of the sterilized women who had been married 5 to 9 or 10 to 14 years at the time of the sterilization operation was very high. The specific numbers of women by duration of marriage were as follows, periods of six months separation or more having been subtracted:

Duration of Marriage Years	*Number of Women*
0– 4	16
5– 9	144
10–14	119
15–19	42
20 or More	16
Unknown	1

The median duration of marriage was 10.4 years. This may be regarded as a different expression of the fact that women aged 30 to 39 years represented the highest proportion of those who had been sterilized.

The 338 women who were sterilized had had a total of 1,937 past pregnancies, including those existing at the time of the operation. The distribution of the women by the number of the pregnancies was as follows:

Number of Past Pregnancies	*Number of Women*
1	4
2	9
3	27
4	57
5	65
6	59
7	64
8	24
9	16
10	6
11	2
12	4
13	1

Of the 1,937 past pregnancies, 590, or 30.5 per cent of the total, had been terminated by an induced abortion and 83, or 4.2 per cent of the total, had been terminated by natural abortion. Among the total of 338 women, only 40, or 11.8 per cent, had not become pregnant at least four times before being sterilized.

The average number of living children per woman was 3.4, of whom 1.8 were boys and 1.6 girls. Six of the 338 women had no living children, while 75, or 22.2 per cent of the total, had only one or two children. However, more than three-fourths had three or more living children. The distribution of the women by number of living children was as follows:

Number of Living Children	*Number of Women*
0	6
1	11
2	64
3	119
4	75
5	41
6	15
7	7

Male / Female	0	1	2	3	4	5	6	7	Total
0	6	6	24	22	4	1	–	1	64
1	5	31	45	15	10	2	–	–	108
2	9	42	31	10	6	1	–	–	99
3	10	22	11	3	3	–	–	–	49
4	3	9	1	1	–	–	–	–	14
5	–	3	1	–	–	–	–	–	4
Total	33	113	113	51	23	4	0	1	338

Table 5. Numbers of living children, by sex, at time of sterilization.

The combination by sex among the children living at the time of the sterilization are given in Table 5.

Unless there is an important health reason it is generally believed that it is when there are two, three or four children that a couple begins to devote serious consideration to the ultimate size of the family. It is also believed that families prefer male children, and that sterilization or abortion is less likely to occur when living children are wholly or predominantly female. It is interesting to see in our data in the two, three, and four child families those families with male children only outnumber those with female children only in each case. This tendency is particularly pronounced in families with two or three children. Thus, it appears that families with no male children are less apt to have a sterilization operation performed. However, a definite conclusion requires more elaborate analysis.

Among 332 women who had at least one living child at the time of the sterilization, the mean age of the youngest child was 3.4 years. Among 1,345 women interviewed in the abortion study referred to previously, who had at least one living child at the time of the induced abortion, the mean age was 2.5 years. The difference between these two figures is statistically significant.

Previous Attempts at Limitation

It is usually assumed that the decision for sterilization requires strong resolution. Unlike the induced abortion, sterili-

Number of Induced Abortions	Number of Women	Per Cent	Cumulative Per Cent
No Induced Abortion	37	11.0	100.0
Induced Abortions			
1	134	39.6	89.0
2	93	27.5	49.4
3	46	13.6	21.9
4	15	4.4	8.3
5	9	2.7	3.9
6	3	0.9	1.2
7	0	0.0	0.3
8	0	0.0	0.3
9	1	0.3	0.3
Total	338	100.0	

Table 6. Number of induced abortions.

zation is a permanent method of preventing pregnancy. Hence, the data on the relation between sterilization and previous abortion history is very significant. Of the total of 338 women, only 37, or 11 per cent, stated that they had never had an induced abortion. (Table 6.) The remaining 301 women, 89 per cent of the total, had had at least one induced abortion prior to sterilization (including the induced abortion performed at the time of the sterilization). The total number of induced abortions was 590, an average of 1.7 per woman in the total study group. Thus, the vast majority of women had sterilization after having had at least one induced abortion. The majority of these abortions seem to have been performed as a means of family limitation. The women themselves reported only 89 of the total of 590 abortions to have been performed unwillingly for health or social reasons. These facts indicate that sterilization is not sought immediately as a means of family limitation. Decision to have the operation usually was made only after undesirable experiences with induced abortion.

The fact that 90 per cent of the women had decided to have a sterilization operation performed only after having had an induced abortion at least once, also is evidence of the strength of the desire to limit family size. Another question of interest

is how many of the women had ever practiced contraception before sterilization. Of the total of 338 women, 176, or 52.1 per cent, answered that they had done so at one time or another.

The summarized results of detailed inquiry of these 176 women who had once practiced contraception are as follows:

1. *Number of living children.* Sixty-two women, 35.2 per cent, began to practice contraception when they had three living children, 46 or 26.1 per cent when they had two, and 34 or 19.3 per cent when they had four.

2. *Contraception failures.* Of the 176 women, only 17 (9.7 per cent) had never become pregnant because of failure in contraception; the remaining 159 had experienced failure at least once.

3. *Method.* The most frequent was the condom (alone or with jelly) used by 48 (27.3 per cent). Then follow condom plus safe period—24 (13.6 per cent), safe period alone (abstinence during the fertile period)—21 (11.9 per cent), jelly alone—15 (8.5 per cent), vaginal diaphragm (alone or with jelly)—11 (6.3 per cent), withdrawal—10 (5.7 per cent), and the remaining 47 (26.7 per cent) were other methods used alone or in combination.

4. *Satisfaction with contraception.* The women's answers to the question as to whether or not they were generally satisfied with the methods showed that 150 (85.2 per cent) found them unsatisfactory. The most important reasons were the objection of the husband (54 cases) and the lack of reliability of the methods used (53 cases).

In summary, 89 per cent of the women who were sterilized had had at least one induced abortion, and 52 per cent had practiced contraception at some time prior to the sterilization. Among the contraceptors, the method most frequently employed was condom alone or in combination with other methods (72 cases, or about 40 per cent). In many instances, couples were not satisfied with the methods they used, and there were many failures. These results should be interpreted cautiously, however. The study group may have been selected with reference to failure at contraception. No data were se-

cured on regularity of use. The data merely indicate that these women were acquainted with some method of contraception and had been willing to try it. In many cases they resorted to sterilization only after accumulations of contraception failures.

It is of interest to determine the chronological relation between abortion and contraception among those women who had practiced contraception before the sterilization. In the group of 176 such women, 137, or 77.8 per cent, had never practiced contraception prior to the first induced abortion. Of the total study group of 338 women, only half had ever practiced contraception, but among those who made attempts at family limitation more than three-fourths attempted the practice of contraception before they resorted to abortion. Contraception was generally unsuccessful among these women, so they sought their solutions in sterilization, sometimes after long-continued but unsuccessful practice of contraception and subsequent induced abortions or sometimes after induced abortions with contraception discontinued.

The Choice of Sterilization—The Women's Replies

The women themselves were asked why they decided to have the sterilization operation. If only the reasons which the women themselves gave as the most important are tabulated, the results are as follows:

1. *Health*—134 women, 39.6 per cent

Gynecological or obstetrical—72, of which 41 were toxemias of pregnancy and 31 were diseases of the uterus, disorders associated with pregnancy, delivery or the puerperium. General disease of the mother—54, of which 28 were tuberculosis, 26 other diseases. Eugenic, including mental disease or other hereditary diseases in the mother or the relatives—8.

2. *Economic*—60 women, 17.8 per cent

Difficult household financing—42. Household financing more difficult if another child—8; money needed for education—7. Have only girls and need money for weddings—3.

3. *Lack of desire for more children*—114 women, 33.7 per cent
Detailed reasons given here were mainly economic.

4. *Social*—30 women, 8.9 per cent
Do not want a large family because of business or housekeeping—15. Other people or the former wife's children are living together—6. Old age of husband or wife—5. Others—4.

In 174 of the cases, more than half of the total, the most important motive given by the woman was related to economic considerations. Even among those cases in which other reasons were mentioned, economic conditions often played a role as indirect motives. Hence, it is interesting to count all the women who mentioned some economic considerations among the reasons for sterilization. The result of such a tabulation indicated that there were 225 such women, two-thirds of the total.

The reasons for sterilization among those six women who had no children at all at the time of the sterilization are also interesting. Three reported that the mother's life would be endangered if she became pregnant, two because of a narrow pelvis and one because of valvular disease of the heart. One reported a hereditary disease in the woman, diagnosis unspecified. Two gave economic reasons, one that she was on public relief, the other that there were already too many dependents.

In the previous paragraphs, the direct reasons leading to sterilization were noted. The next pertinent question is the reason why sterilization was selected in preference to other methods of family limitation such as induced abortion or contraception. There was detailed questioning on this subject. The results are summarized on the following page.

Thus, there were three principal reasons for selecting sterilization: (1) The recommendation of a doctor. (2) Unsatisfactory experience with induced abortion, contraception, or both. (3) The desire for a reliable method of family limitation. It is interesting to note that the recommendation by a doctor was the most important single reason. This apparently means that many women had thought much about family limitation and so were easily moved to the decision for a sterilization operation

Reasons	*Number of Women*	*Per Cent*
1. Recommended by doctor	132	39.1
2. Tried abortion and contraception but neither was satisfactory	70	20.7
3. Strong reason for limiting size of family, hence wanted a method not subject to failure	41	12.1
4. Had induced abortion, but did not regard it as a good way of limitation	23	6.8
5. Necessary to have another operation, so sterilization was simple	13	3.8
6. Practiced contraception but it was not satisfactory	11	3.3
7. Mental diseases, self or relatives	5	1.5
8. Others, including various combinations of (1) through (7)	43	12.7
TOTAL	338	100.0

by the expert advice of the doctor. The fact that many women were sterilized because they were not satisfied with other methods of family limitation supports the view that there had been a cumulation of unsatisfactory experience not alone with contraception but also with induced abortion. Briefly speaking, women wanting sterilization usually had been worried about having the operation and some driving force was needed in order to materialize a long-felt desire. Examples are the women who had experienced some undesirable result from induced abortion or the practice of contraception, or the women who had to have another operation anyway and had a sterilization operation too because the doctor recommended it.

The reports of the women as to the role of medical advice in the decision for sterilization is supported by the statements of the majority of the women that they had first learned something of sterilization through doctors or other professional groups. If considered in conjunction with the fact that many women were informed about sterilization by members of their

families or friends, it would appear that information about sterilization spreads mainly by word of mouth rather than through printed matter or meetings. This is in sharp contrast with the general observation that information about contraceptive measures usually is obtained from newspapers and magazines.

Source of Information	*Number of Women*	*Per Cent*
Professional groups (mainly doctors)	144	42.6
Friends	61	18.0
Printed matter	30	8.9
Families	23	6.8
Meetings	7	2.1
Professional groups and printed matter	24	7.1
Friends and printed matter	16	4.7
Others (various combinations of those listed above)	33	9.8
TOTAL	338	100.0

MEDICAL AND HEALTH ASPECTS

In the present survey, only 45 women, 13.3 per cent of the total, had sterilization performed as a single operation; 293 women had another operation performed at the same time. Of these other operations, 204, 69.6 per cent, were induced abortions, while in 56 cases, 19.1 per cent of the total, other operations than induced abortion, i.e., operation of retroversion, appendectomy, removal of ovarian cyst. Both induced abortions and other operations were performed simultaneously in 33 cases, 11.3 per cent of the total. Thus, only a small proportion of the women had sterilizations performed alone; the majority had some other operation, mainly induced abortion, which gave an opportunity for sterilization.

The length of hospitalization in relation with the kind of operations performed simultaneously is given in Table 7. The median length of stay in a hospital or private clinic was as

follows: (1) All cases—9.9 days. (2) Sterilization performed alone—8.7 days. (3) Sterilization performed with induced abortion or with induced abortion as well as another operation —9.3 days. (4) Sterilizations performed with operations other than induced abortion—12.3 days.

Kind of Sterilization Operation. Of the 338 operations, 278, or 82.2 per cent, were performed by the abdominal approach, while 60, or 17.8 per cent, were performed by the vaginal approach. In all cases the operation was ligation and/or section of the Fallopian tubes. If these 338 operations are broken down by place of operation, 254 were in a hospital and 84 in a private clinic. In regard to the ratio of the two kinds of sterilization operation, there was no great difference between those performed in a hospital and those in a private clinic.

When the ratio between the abdominal and vaginal approaches of sterilization operation was related to the other kinds of operations performed simultaneously, it was found that the ratio was not greatly different whether or not an induced abortion was performed simultaneously. However, the proportion of abdominal approach was relatively higher in cases where some other operation was performed simultaneously, e.g., operation of retroversion, appendectomy, or removal

Table 7. Length of hospitalization in relation to type of operation.

Number of Days Hospitalization	Sterilization Alone	Sterilization + Induced Abortion, or Sterilization + Induced Abortion + Another Operation	Sterilization + Operation Other than Induced Abortion	Total
1– 3	1	2	1	4
4– 6	11	45	3	59
7– 9	19	93	9	121
10–12	9	66	20	95
13–15	2	21	15	38
16–40	3	9	8	20
Total	45	[1]236	56	[1]337

[1] There is one other case for which no information was available.

of ovarian cyst. In the 45 cases where sterilization alone was performed, the abdominal approach was used in 33 cases and the vaginal approach in 12 cases.

Month of Pregnancy, Sterilization with Induced Abortion. As mentioned earlier, there were 237 women, 70.1 per cent of the total, who had an induced abortion performed simultaneously with sterilization. The operation was performed before the third month of pregnancy in 83.1 per cent of the cases, during the fourth month in 10.6 per cent, and from the fifth to the seventh month in 6.3 per cent. The breakdown by type of operation was as follows:

Month of Pregnancy	*Abdominal*	*Vaginal*
Before end of third	155	42
During fourth	22	3
Fifth to seventh	15	0
TOTAL	192	45

The sterilization operation combined with induced abortion performed from the fifth to the seventh month of pregnancy represented only 6.3 per cent of the cases, which is markedly lower than the percentage in the induced abortion study.

RESULTS OF STERILIZATION—PHYSICAL AND MENTAL

There was rather detailed questioning as to the physical and mental changes which the women recognized after the operation. Interpretation of the answers is difficult, however, for only 45 women out of the total of 338 had a sterilization independently of another operation. Obviously 45 is too small a number to obtain significant information about changes which were due solely to sterilization. Even so, the results observed by these 45 women may be of interest and are summarized below. It should be remembered that from 2 to 18 months elapsed between the operation and the interviews.

Of the 45 women, 23 recognized no changes. Thirteen women reported some disorders or discomforts, although they were not

severe. Nine felt that they had become healthier after the operation. The chief complaints in the 13 women who felt some discomforts were headache and such various conditions as bleeding, pain in the waist, abdominal pain, lassitude, or a neurotic condition.

The data in regard to changes in menstruation after the operation were tabulated for the 45 women who had a sterilization operation only. Nineteen said that they recognized no changes, and 26 observed changes of one kind or another. The most frequent change was a lesser amount of bleeding, shorter duration of menstruation, or the establishment of regularity in the cycle. In only one case did new menstrual disorders appear after the operation. In other words, three-fifths of the 45 women recognized some changes in menstruation, but almost all changes were improvements. Only one woman experienced menstrual disorders, and this case was a vaginal operation.

The proportion of women who observed no menstrual changes after the operation in the 338 cases as a whole was about the same as in the 45 cases, or 44 per cent. Among changes which took place after the operation, the majority were for the better. However, about one-sixth of the women who observed changes complained of menstrual disorders or irregularity in the cycle as appearing or growing worse after the operation. Since most of the group interviewed had another operation performed with the sterilization, it is apparent that the other operation might have influenced the observed changes.

Failures in Sterilization

Among the 338 sterilizations surveyed, 5 were cases in which the women were having an operation performed for the second time because a first operation performed from one to four years previously had failed. In addition, there was one apparent failure in a woman who eight months before the interview had had a sterilization operation through an abdominal approach simultaneously with an induced abortion. Since that time, she

had experienced symptoms of pregnancy on three occasions and her doctor had performed a curettage. Although confirming evidence of these pregnancies was not obtained, the woman planned to repeat the sterilization operation. Failures in sterilization among the 338 operations are not known except in this one case, but it will be some time before the final result can be observed.

The Cost of Sterilization

A tabulation of the total expenses which the women incurred for their sterilizations gave the following results: (1) When

Table 8. The cost of sterilization.

Total Expense (Yen)	Sterilization Alone	Sterilization with Other Operations	Total
	WITHOUT SUBSIDY		
1,000– 5,000	—	1	1
5,000–10,000	11	39	50
10,000–15,000	9	53	62
15,000–20,000	1	12	13
20,000–25,000	—	5	5
25,000–30,000	—	2	2
30,000–35,000	—	4	4
Total	21	116	[1]137
	WITH SUBSIDY		
0	2	11	13
1– 2,000	—	2	2
2,000– 4,000	2	14	16
4,000– 6,000	6	51	57
6,000– 8,000	4	34	38
8,000–10,000	6	21	27
10,000–12,000	3	19	22
12,000–14,000	—	10	10
14,000–16,000	—	7	7
16,000–30,000	1	4	5
Total	24	173	[1]197

[1] There are four other cases for which information was incomplete. Two were cases with subsidy, but the amount of the expense was not known. One was a case with no subsidy, but the amount of the expense was not known. One was a case for which no information about the subsidy or the amount of the expense was available.

there was no subsidy, such as insurance, the cost averaged about 12,000 yen—U.S. $33.30. (2) With a subsidy, such as the mutual relief insurance of an establishment or a company, the National Health Insurance, or public assistance by partial subsidy from the prefecture, or subsidy under the Daily Life Security Law, the cost to the patient averaged about 7,000 yen—U.S. $19.50.

These results can be further broken down in accordance with whether the sterilization was performed alone or with other operations, mainly with induced abortion. (Table 8). Where there was no subsidy, the expense averaged 10,120 yen for sterilization alone and 12,630 yen for sterilization with other operations. With a subsidy, average costs were 7,250 yen and 7,310 yen respectively. The expense of sterilization was far greater than that of induced abortion, which was found earlier to average 2,200 yen.

In 199 of a total of 338 cases, or 58.9 per cent, the operation was performed with assistance from an agency which subsidized the cost wholly or in part. Greater availability of such subsidies would alleviate one of the major obstacles now confronting women who desire sterilization.

The Evaluation by the Women

Of the total of 338 women, 171 or 50.6 per cent of the total, stated that they did not have any difficulties worthy of mention. The following table shows the results of a tabulation with regard to the difficulties mentioned by the remaining 167 women. (When more than one item was mentioned by a woman, all of the difficulties stated were counted.)

The most frequent difficulty was that the women found the required length of stay in a hospital or clinic too long a time to be away from their housekeeping or the care of their children. Next most frequent difficulties were those related to fear of the operation or of possible changes in general physical condition afterward. Also, many found that it was not easy to meet the necessary costs. There were some women who went through

Kind of Difficulties	*Number of Times Mentioned*	*Per Cent of Mentioned Difficulties*
1. Too busy to be hospitalized for a certain period of time	75	35.7
2. Fear of operation, or of changes in general physical conditions after operation	38	18.1
3. Too poor to pay for operation	38	18.1
4. Had to wait for some time because of conditions of hospital	15	7.1
5. Decided to have the operation but not quite willing to do so	15	7.1
6. Objection of family, mainly husband	10	4.8
7. Others	19	9.1

with the operation rather unwillingly, but, on the other hand, there were some who were so firmly determined that they had it performed against the opposition of their families.

Of the 338 women, 325 had the operation performed with the agreement of their husbands. The remaining 13 include 9 women who had the operation even though their husbands opposed it and 4 who had it without their husbands knowing about it.

The major problem involved for the women seems to have been the making of the decision to be sterilized. One question in the present survey was concerned with the length of time

Time Between Final Decision to Have Operation and Performance of It	*Number of Women*	*Per Cent*
Less than one week	193	57.1
Less than one month	70	20.7
Less than six months	41	12.1
Less than one year	15	4.5
More than one year	19	5.6
TOTAL	338	100.0

between the final decision to have the operation and the actual performance of it. In over half the cases, the operation was performed less than one week after the decision had been made to have it.

Almost two-thirds of the women reported that there had been no changes in their sexual life after the operation. In 106 cases, 31 per cent of the total, the changes were for the better. In only 21 cases they were for the worse. The most important reason for improvement was release from fear of pregnancy. Many women stated that the sterilization increased satisfaction by husbands also. Although there are some previous publications on this subject, most of them concerned patients with mental disease. Since the present survey dealt primarily with normal women, its findings are of great interest.

Although some women experienced certain difficulties before the operation and a few had difficulties after it, 309 women, 91.4 per cent of the total, reported that they were generally satisfied with the operation. It was the impression of the interviewers that the most frequent reason for satisfaction was the surety that no unwanted pregnancy could occur.

Each woman was asked the following question: "Would you recommend the same operation to others, judging from your own experience, if their conditions were such as yours?" The following answers were obtained:

Recommendation	*Number of Women*	*Per Cent*
Yes, absolutely	287	84.9
Yes, conditionally	10	2.9
No	33	9.8
No answer	8	2.4
TOTAL	338	100.0

Thus, the great majority of women replied that they would recommend sterilization to others. Among these answers, however, there were some to which conditions were attached.

These conditions were, for example, "in case no other methods of limitation are successful" or "in case it is certain that no more children will be wanted." Among those who did not want to recommend sterilization, the principal reasons were: "It is somewhat lonely to have the feeling that no more children can be born," or "It would be a cause of trouble if another child should be wanted." Fourteen women gave answers such as these. Thirteen would not recommend sterilization because of the uncomfortable experiences at the time of the operation or the physical and mental complaints after it. Six women gave various other reasons.

The women were asked their opinions about male sterilization. Some two-fifths of the women had no knowledge of sterilization for men, but among those who knew about it the pros and cons were about equal. The most frequent reason for opposition was the fear of mental and physical disabilities in men. This was often phrased in such ways as, "If it was done, a man cannot work well," "It makes poor health," or "It does harm to the sexual abilities of men." These answers were given in about two-thirds of those who were against the male sterilization. Among about 14 per cent of the women, the reason for opposition was "After a man was sterilized, you cannot say he will always be well-conducted." There were fewer women in favor of sterilization for men than might have been anticipated.

Summary

A survey of reported sterilizations of women was made in medium-sized and small cities and their adjacent rural areas in four selected Health Center Districts of Shizuoka Prefecture in Japan. Data were collected from a total of 338 sterilized women by two doctors through personal interviews. All of these women had had sterilization performed under the provisions of Article 3 of the Eugenic Protection Law, and the sterilization had been officially reported to the local health authorities during the period from April 1952 through March 1953. The educational as well as the economic status of the 338 couples sur-

veyed was somewhat higher than that revealed in an induced abortion study conducted previously in approximately the same areas.

At the time of the sterilization operation, almost three-fourths of the women were between 30 and 40 years of age; the median duration of marriage was about 10 years. The average number of past pregnancies, including those which existed at the time of the sterilization operation was 5.7; that of past induced abortions, 1.7. The average number of living children at the time of sterilization was 3.4. Less than two per cent of the women had no living children. Nine-tenths of the women had had at least one induced abortion prior to being sterilized.

Approximately half of the 338 couples had practiced contraception at one time or another prior to the sterilization of the wife. Nearly four-fifths of the couples who had ever practiced contraception had practiced it prior to the first induced abortion. Sterilization was performed eventually because of the unsatisfactory results of contraception and induced abortions.

Among the 338 women interviewed, only 45 had a sterilization operation performed alone; all the rest had some other operation performed at the same time, generally an induced abortion. The average length of stay in a hospital or private clinic was about 10 days. The expense averaged about 12,000 yen (U.S. $33.30) without subsidy and about 7,000 yen (U.S. $19.50) with subsidy. Partial or total subsidy was given in three-fifths of the cases.

The most frequent reason given for sterilization was that of difficulties in the household economy; economic reasons were mentioned in more than two-thirds of the cases. Reasons related to health were given as the chief reason for the operation by two-fifths of the women. In only eight cases could the reasons be considered "eugenic."

In answer to the question as to why sterilization was decided upon rather than contraception or induced abortion, most of the women said either "because the doctor recommended it" or "because both of those other methods had proved to be un-

satisfactory." Some kind of driving force appeared to be necessary to make the woman decide on sterilization. Sometimes it was a succession of undesirable experiences with induced abortion; other times advice from a doctor or from a friend or relative was influential enough to tip the scales in favor of the operation. The most important sources of information about sterilization were doctors.

The most frequent obstacles to having the sterilization operation were the long stay in the hospital with its interference with home responsibilities and the difficulties in meeting the cost.

Questions were asked in regard to physical and mental changes experienced after the operation. In so far as sterilizations alone were concerned, almost one-third of the women reported slight complaints—e.g., headache. Generally speaking, however, the course after sterilization was good. Nearly all of the women were satisfied with the operation, while almost nine in each ten said that they would recommend it to others in similar circumstances.

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CHANGES IN FERTILITY BY SOCIO-ECONOMIC STATUS DURING 1940–1950

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THAT spectacular increases in the birth rate in this country have occurred since 1940 is well known. However, there have been no clear-cut and unequivocal answers to such questions as (a) the significance of the increase in birth rates to size of completed family, (b) the incidence of the increase by color, age, and socio-economic status, (c) the impact of the increased birth rate on patterns of differential fertility, (d) the trend of marriage rates by socio-economic status, and (e) the joint impact of trends in marriage rates and trends in marital fertility on the pattern of differential fertility of all women regardless of marital status.

The previously existing data on recent trends in fertility differentials in this country have been based in large part on the Current Population Survey.[2] In 1947 and for several years thereafter the Bureau of the Census published releases concerning fertility ratios according to such indices of socio-economic status as education of the woman, tenure and rental value of the home, and occupation of the husband. Although they filled a distinct need, these data had two main deficiencies: (a) because of limited size of samples these data could not be subdivided sufficiently for adequate analysis, (b) because they are affected by timing of births, and by mortality and place of residence of children, the fertility ratios are not very adequate indices of lifetime fertility. This deficiency is not present

[1] From The Milbank Memorial Fund. This is a preliminary report on a section of data which will be treated in more detail in a forthcoming 1950 Census monograph on fertility being prepared by the present author, P. K. Whelpton, and Wilson H. Grabill.

[2] U. S. Bureau of the Census: *Current Population Reports*—Population Characteristics, Series P-20, No. 18, June 30, 1948; Series P-20, No. 27, February 3, 1950; Series P-20, No. 46, December 31, 1953.

Kiser, Clyde V.: Fertility Trends and Differentials in the United States. *Journal of the American Statistical Association*, 47, No. 257, March 1952, pp. 25–48.

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in Current Population Survey data relating to 1952 and 1954 based upon the total number of children ever born but again the samples are too small to permit close analysis.

Although the 1950 Census data regarding children ever born are less recent than those just mentioned, they are based upon more adequate samples. The delay in the issuance of 1950 Census data on differential fertility by socio-economic status has been due largely to lack of funds for the tabulations. The original plan for rather detailed tabulations, including some by duration of marriage interval, had to be abandoned. Through the financial assistance of The Population Council and the Milbank Memorial Fund, some tabulations of the 1950 Census data were made, including those on children ever born and own children under 5 in relation to residence, age, color, marital status, education of the wife, and occupation of the husband. The basic tables have been published recently as a special report of the Bureau of the Census.[3]

The present paper gives a preview of some of the 1940–1950 changes in fertility by socio-economic status and of their effects upon patterns of differential fertility. It does not attempt to answer many of the questions posed in the first paragraph. Neither will it be concerned much with efforts to interpret existing trends in fertility and fertility differentials. These more detailed matters will be considered in the Census monograph on fertility.

Nature of the Data. In the 1950 Census a question "How many children has she ever borne, not counting stillbirths?" was asked of a 3.33 per cent sample of ever-married women. Although it was restricted to a small sample, the question was by no means an innovation. A similar question was asked in the 1940 Census of a 5 per cent sample of ever-married women. It was asked of all ever-married women in the Censuses of 1890, 1900, and 1910.

Although the question on total number of children ever born

[3] United States Bureau of the Census: FERTILITY, Special Report, P-E No. 5C, Washington, Government Printing Office, 1955, 184 pp.

first appeared in the 1890 Census, the data remained unused on the original enumeration schedules. Indeed, it was not until the late 'twenties that the data from the 1900 and 1910 schedules were transcribed for studies of differential fertility. In 1928 a sample of records was extracted from the 1910 Census for about 100,000 urban and rural native-white married women living in Northern and Western states. This was done through a cooperative arrangement of the Census Bureau and the Milbank Memorial Fund and it resulted in the study by Sydenstricker and Notestein "Differential Fertility According to Social Class," published in the March, 1930, issue of the *Journal of the American Statistical Association.* Somewhat later, analogous materials were secured from the 1900 Census for selected samples of married women living in the East North Central states. This was done largely through the stimulus of Professor W. F. Ogburn who was then director of the President's (Hoover's) Research Committee on Recent Social Trends. During the 'forties the Census Bureau tabulated the data for samples from the 1910 Census for comparisons with 1940 and published a fine series of tabulations on various aspects of differential fertility in 1940 and 1910.[4]

Many students of population have hoped that the fertility data collected in the 1950 Census could be tabulated in as much detail as were those for 1910 and 1940. Indeed there were suggestions for some much more refined tabulations involving such matters as order of birth, interval between marriage and

[4] United States Bureau of the Census: POPULATION, DIFFERENTIAL FERTILITY, 1940 AND 1910, FERTILITY BY STATES AND LARGE CITIES. Washington, Government Printing Office, 1943, 281 pp.

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United States Bureau of the Census: POPULATION, DIFFERENTIAL FERTILITY, 1940 AND 1910. FERTILITY BY DURATION OF MARRIAGE. Washington, Government Printing Office, 1947, 338 pp.

first birth and between successive births, age of woman in single years, and duration of marriage in single years. It was argued that not until more refined data are available could the significance of the recent increases in fertility be assessed adequately. It was believed by some that more refined fertility data would be needed for intelligent approaches to questions of future population growth. As expected, however, there were also demands from other quarters for tabulations of other types of data. Although the "minimum tabulations" of fertility data that were finally made are far from ideal, they do provide the bases for significant advances in our knowledge of fertility trends and differentials within this country.

Percentage Changes in Fertility Rates During 1940–1950, By Age, Marital Status, Color, and Residence. This topic will be treated in full in the forthcoming monograph. However, since the variables of age, color, and residence must be considered in the discussion of trends in differential fertility by socioeconomic status, a brief treatment of the 1940–1950 trends in fertility by the broader demographic factors is given for purposes of interpretation.

Age and Marital Status. For a quick grasp of the overall trends in fertility during 1940–1950 by age and marital status, skeleton figures from the Bureau of the Census are presented in Table 1. The data give for 1940 and 1950 by age of the woman (a) number of children ever born per 1,000 women and per 1,000 ever-married women and (b) number of own children under 5 years of age per 1,000 women and ever-married women.

In the first place, it will be noted that when the fertility rates and fertility ratios refer to *all women* (single and ever married combined) the 1940–1950 percentage changes are sharply and consistently related to age. There is virtually a straight progression from highest percentage *increase* at youngest age to highest percentage *decrease* at relatively old age. The 1940–1950 increase in the fertility rate (children ever born) is 54 per cent for age 15–19; the *decrease* is 16 per cent for the 45–49 age group. Likewise, the percentage changes of the fertility ratios

range from an increase of 58 per cent at ages 15–19 to a decrease of 12 per cent at ages 45–49.

That increases in general fertility rates have resulted from increases in proportions married at given ages as well as from increases in marital fertility, is very apparent by comparing the magnitude and age-pattern of the 1940–1950 increases in marital fertility rates and ratios with those based upon all women regardless of marital status. (Table 1.) The percentage increases in the indices of marital fertility are much lower than the increases in the indices of *general* fertility. Thus as compared with the 54 per cent increase in the *general* fertility rate, at ages 15–19 there is only a 6 per cent increase in the fertility

Table 1. Number of children ever born and number of own children under five years of age per 1,000 women 15–49 years of age, by age and marital status of the woman. United States, 1940 and 1950.[1]

Age of Woman	1940	1950	Per Cent Increase 1940–50	1940	1950	Per Cent Increase 1940–50
	Children ever born per 1,000 women			Children ever born per 1,000 women ever married		
15–19	68	105	54.4	572	604	5.6
20–24	522	738	41.4	987	1,082	9.6
25–29	1,132	1,436	26.9	1,463	1,654	13.1
30–34	1,678	1,871	11.5	1,964	2,059	4.8
35–39	2,145	2,061	−3.9	2,414	2,247	−6.9
40–44	2,490	2,170	−12.9	2,754	2,364	−14.2
45–49	2,740	2,292	−16.4	2,998	2,492	−16.9
	Children under 5 per 1,000 women			Children under 5 per 1,000 women ever married		
15–19	59	93	57.6	493	536	8.7
20–24	396	603	52.3	747	883	18.2
25–29	538	782	45.4	695	900	29.5
30–34	434	594	36.9	508	653	28.5
35–39	284	366	28.9	319	399	25.1
40–44	140	167	19.3	155	181	16.8
45–49	43	38	−11.6	47	41	−12.8

[1] Adapted from U.S. Bureau of the Census: Fertility, *Special Report*, P.E. No. 5C, Washington, Government Printing Office, 1955, Tables A and B.

of married women at these young ages. The corresponding figures for fertility ratios are 58 per cent and 9 per cent. After age 35, the 1940–1950 percentage changes in marital fertilty rates are about the same as those of the general fertility rates. This virtual equality arises from the fact that even in 1940 only a small minority of women 35 and over were unmarried and that 1940–1950 *increases* in proportions ever married at these late ages are negligible.

As for age-pattern of the increases of marital fertility rates, the maximum (13 per cent) is found for the age group 25–29. The highest 1940–1950 percentage increase in the marital fertility *ratio* (30 per cent) is also found at ages 25–29. In general, the 1940–1950 percentage increases in fertility ratios are higher than those of comparable fertility rates based upon children ever born because the fertility ratio in the nature of the case relates only to fertility during the five years preceding the year considered—not to the total past fertility. The 1945–49 period, of course, was one of unusually high rates of marriage and natality.

Fertility rates for 1940 and 1950 by age, color, and residence are provided in the new 1950 Census report on FERTILITY. As indicated in Table 2 for the United States as a whole, the 1940–

Table 2. 1940–1950 percentage increase in number of children ever born per 1,000 ever-married women, by color, age, and residence.[1]

Age of Wife	White				Nonwhite			
	Total	Urban	Rural Nonfarm	Rural Farm	Total	Urban	Rural Nonfarm	Rural Farm
15–19	1.3	3.4	2.5	1.4	28.1	33.4	24.1	26.0
20–24	8.7	15.4	9.6	3.9	18.0	33.6	29.2	19.5
25–29	14.2	24.2	9.3	7.0	7.3	20.8	20.7	13.2
30–34	5.5	12.8	2.7	−2.3	0.1	5.8	13.5	13.9
35–39	−6.8	−2.6	−7.6	−9.5	−7.6	−6.2	3.4	8.3
40–44	−14.4	−13.0	−13.8	−12.3	−13.0	−12.7	−3.4	4.2
45–49	−17.3	−16.8	−16.8	−11.7	−14.8	−6.5	−15.2	−0.8

[1] Computed from U.S. Census Bureau: FERTILITY, *Special Report*, P.E. No. 5C, Tables 4–6. For this table the 1950 classification by residence is based on the "old" definition of urban. With respect to percentage increases by color, the 1940 data relate to native whites and all Negroes instead of "white" and "nonwhite" as in 1950.

1950 percentage increase in fertility was lower for whites than for nonwhites at ages under 25 and higher for whites than for nonwhites at ages 25–34. There was little difference by color in the percentage *decrease* in fertility at ages 35–49.

Among the whites, the highest percentage increase in fertility of ever-married women was that observed at ages 25–29. Among the nonwhites the maximum percentage increase was at youngest ages.

Among the whites, the observed percentage increases in fertility rates tended to be highest in urban areas and lowest in rural-farm areas. The observed percentage decreases were directly related with age in each type of community. To some extent, these patterns were also found for the nonwhites.

Percentage Changes in Fertility Rates During 1940–1950, by Occupation and Education. Previous analyses have indicated that the highest proportionate increases in fertility ratios since 1940 were experienced by groups formerly characterized by lowest fertility. Thus it was found that the percentage increases were higher for the Northeast than for the South, higher for urban than for rural areas, higher for professional groups than for farmers and higher for the people of college status than for those of lower educational attainment.

With certain qualifications the current data bear out the generalizations regarding changes in fertility by occupational and educational status. Among urban white married women (married once—husband present) under 40 years of age, the percentage increase in fertility was in virtually all cases higher for the wives of professional men than for any other occupational group.[5] (Figure 1 and Table 3.) This held true for all

[5] It should be acknowledged that on several scores the 1950 fertility rates by occupation and education are not precisely comparable with those of 1940. The tabulations of the 1950 data utilize the new definition of urban. The 1950 tabulations were made for whites and nonwhites rather than for native-whites and Negroes as in 1940. The 1950 data are presumably more accurate with reference to percentages childless; the 1950 Census schedule contained provision for explicitly indicating "no child" if the respondent reported childlessness. Furthermore, some adjustments of the data to remove biases of other types were made in the 1950 distributions. (*See* United States Bureau of the Census: FERTILITY *Ibid.* pp. 6–8.) Analyses by the Census Bureau have indicated that a large proportion of the "unknowns" with

(Continued on page 400)

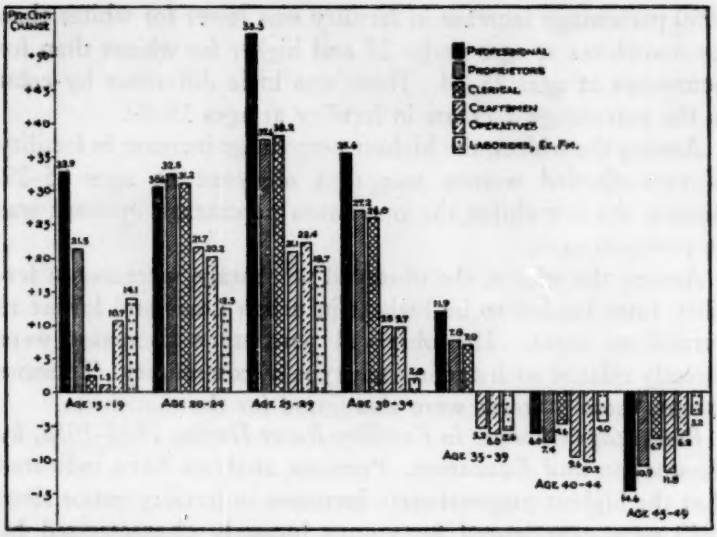

Fig. 1. Per cent change, 1940–1950, in the number of children ever born per 1,000 white women (married once—husband present), by age of wife and occupation group of the husband. Urban areas of the United States as defined in 1940 and 1950. The 1940 data relate to native whites. (*See* Table 3.)

age groups except one (20–24) in which case the percentage increases were practically the same (31–33 per cent) for the professional, proprietary, and clerical classes. By age, the 1940–1950 percentage increase in fertility of all urban white women (married once—husband present) is highest (22 per cent) at ages 25–29. At this same age it is also highest (53 per cent) for the professional class.

Whereas, the percentage change in fertility rates of the professional class during 1940–50 ranged from 12 to 53 per cent for age groups under 40, the corresponding range for urban wives of unskilled laborers was from a decrease of 6 per cent (at ages 35–39) to an increase of 19 per cent at ages 25–29. At ages of 40 and over decreases rather than increases in fer-

reference to number of children in the 1940 Census enumeration were in fact childless women.

Although the net effect of the above-mentioned differences between the 1940 and 1950 Censuses cannot be stated, the biases do not run in the same direction and they probably do not affect the differentials in percentage increases very greatly.

tility rates during 1940–1950 were the rule rather than the exception.

The pattern of change in fertility rates by education of urban white ever-married women is much the same as the one by

Table 3. 1940–1950 percentage increase in number of children ever born per 1,000 white women (married once—husband present) by age of wife, occupation group of husband, and residence.[1]

Occupation Group of the Husband	15–19	20–24	25–29	30–34	35–39	40–44	45–49
	URBAN						
Professional	32.9	30.6	53.3	35.6	11.9	−6.0	−14.6
Proprietors	21.5	32.5	37.6	27.2	7.8	−7.4	−10.9
Clerical	2.6	31.2	38.2	26.0	7.0	−4.6	−6.7
Craftsmen	1.3	21.7	21.1	9.8	−5.2	−9.6	−11.8
Operatives	10.7	20.2	22.4	9.7	−6.0	−10.2	−6.2
Service Workers	7.4	25.0	31.1	13.8	−3.6	−13.8	−8.9
Laborers, Exc. Farm	14.1	12.5	18.7	2.0	−5.6	−4.0	−3.2
Farmers	*	*	*	*	37.0	28.1	14.8
Farm Laborers	*	−2.0	25.6	23.6	*	*	*
	RURAL NONFARM						
Professional	*	38.3	40.6	36.6	8.9	−6.4	−19.5
Proprietors	14.2	12.6	28.9	18.3	3.1	−8.7	−11.5
Clerical	19.9	17.8	29.9	19.7	−0.5	−9.4	−14.9
Craftsmen	−0.3	10.5	16.2	8.9	−4.1	−6.5	−12.2
Operatives	7.7	10.1	9.7	2.0	−2.0	−8.4	−12.2
Service Workers	*	29.8	29.2	6.6	−1.3	−13.0	−15.4
Laborers, Exc. Farm	−12.5	11.7	9.2	5.1	−2.4	−9.7	−10.4
Farmers	*	−2.6	10.9	−6.9	−13.8	−19.1	−18.9
Farm Laborers	−8.0	19.5	18.5	18.2	9.6	3.5	2.9
	RURAL FARM						
Professional	*	*	25.7	53.4	−0.2	3.5	3.0
Proprietors	*	*	19.2	19.4	2.8	−13.0	−20.9
Clerical	*	1.1	3.6	13.3	−9.6	−0.1	−7.0
Craftsmen	*	3.5	9.1	7.9	−4.6	−12.0	−13.0
Operatives	12.8	7.4	13.0	1.7	−3.9	−8.9	−5.5
Laborers, Exc. Farm	−8.8	10.7	9.5	−0.6	−3.7	−2.4	−0.4
Farmers	−11.0	0.9	3.5	−3.4	−11.5	−14.2	−13.9
Farm Laborers	−5.9	6.6	11.0	−2.3	1.9	−10.3	−3.4

* Percentage change not shown because fertility rate for 1940 or 1950 was not computed because of inadequate numbers.

[1] Computed from data given in 1950 and 1940 Census reports on number of children ever born per 1,000 women (once married-husband present). *See* text for discussion of comparability of 1940 and 1950 data.

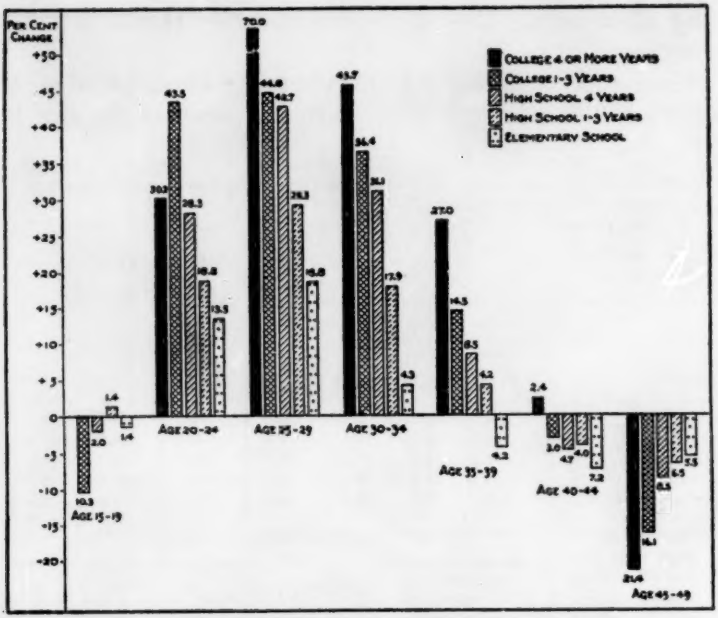

Fig. 2. Per cent change, 1940–1950, in the number of children ever born per 1,000 white ever-married women, by age and number of years of school completed by the wife. Urban areas of the United States as defined in 1940 and 1950. The data for 1940 relate to native whites. (*See* Table 4.)

occupation. (Figure 2 and Table 4.) However, perhaps partly because educational attainment itself is more amenable to quantitative ranking than is occupational group, the data by education much more than those by occupation illustrate the principle of a direct relation of socio-economic status to 1940–1950 percentage increase in fertility among urban-white married women 20–39 years of age. For instance, at ages 25–29 the percentage increases in fertility during the decade of the 'forties ranged from 70 per cent for the college graduates to 19 per cent for those of "elementary school" status. Again, after age 40 decreases rather than increases are the rule and for women 45–49 years of age there is a consistently direct relation between amount of education and amount of decrease in fertility during the decade.

As previously indicated, the fact that women 40–44 and 45–49 in 1950 reported fewer children than did those of comparable age in 1940 simply reflects the earlier trend of generally declining fertility. These women did not participate in the baby boom of the 'forties. They had already completed their families for the most part.

The percentage changes in fertility rates by education and

Table 4. Per cent fertility rate for urban white ever-married women in 1950 is higher or lower than comparable rate for native-white ever-married women in 1940.[1]

Education of the Wife	15–19	20–24	25–29	30–34	35–39	40–44	45–49
	URBAN						
Total[2]	3.4	15.4	24.2	12.8	−2.6	−13.0	−16.8
College 4+	*	30.2	70.0	45.7	27.0	2.4	−21.4
College 1–3	−10.3	43.5	44.8	36.4	14.5	−3.0	−16.1
High School 4	−2.0	28.3	42.7	31.1	8.5	−4.7	−8.5
High School 1–3	1.4	18.8	29.3	17.9	4.2	−4.0	−6.5
Elementary or Below	−1.4	13.5	18.8	4.3	−4.2	−7.2	−5.5
	RURAL NONFARM						
Total[2]	2.5	9.6	9.3	2.7	−7.6	−13.8	−16.8
College 4+	*	64.1	52.9	46.5	15.9	0.9	−21.1
College 1–3	*	49.1	39.3	28.5	8.2	1.5	−15.6
High School 4	−12.7	21.3	22.4	22.5	9.4	−3.6	−10.0
High School 1–3	−3.5	9.9	18.1	9.0	−2.9	−3.8	−14.7
Elementary or Below	0.5	8.9	7.5	1.9	−1.8	−6.2	−6.1
	RURAL FARM						
Total[2]	1.4	3.9	7.0	−2.3	−9.5	−12.3	−11.7
College 4+	*	*	58.6	37.3	7.7	−14.9	−17.4
College 1–3	*	8.9	21.5	18.0	8.7	−9.6	−20.1
High School 4	−14.6	14.4	17.9	8.3	−1.0	−9.5	−6.6
High School 1–3	−0.2	9.4	8.1	3.2	−7.6	−9.0	−8.8
Elementary or Below	−5.7	4.8	7.2	−4.5	−6.3	−8.2	−7.9

* Percentage change not shown because fertility rate for 1940 or 1950 (or both) was not computed because of inadequate numbers.

[1] Computed from data given in 1950 and 1940 Census reports on number of children ever born per 1,000 ever-married women.

[2] For "Total" rows only, the data are based upon "old" definition of urban for 1950.

occupation were of about the same pattern in rural-nonfarm as in urban areas. Within rural-farm areas a conspicuous feature was the decrease in the fertility of farmers and farm laborers at ages 30–49.

1940–1950 Increases in General Fertility Rates by Educational Attainment. The above discussion of 1940–1950 percentage increases in fertility by educational attainment has related to ever-married women. Similar data are also available in relation to all women of given education regardless of marital status. Table 5 presents for three age-groups 20–24, 25–29,

Table 5. Children ever born per 1,000 total women and ever-married women in 1940 and 1950, and percentage increase (1940–1950) in each type of fertility rate. Urban white women of specified age and education.[1]

Education of the Woman	All Women			Ever-Married Women			Per Cent of Women Ever Married	
	Fertility Rate		Per Cent Increase	Fertility Rate		Per Cent Increase		
	1940	1950		1940	1950		1940	1950
	WOMEN AGED 20–24							
College 4+	61	165	170.5	285	371	30.2	24.9	44.3
College 1–3	108	260	140.7	432	620	43.5	28.4	41.9
High School 4	221	495	124.0	607	779	28.3	40.1	63.5
High School 1–3	520	882	69.6	941	1,118	18.8	58.8	78.9
Elementary or Below	610	967	58.5	1,125	1,277	13.5	58.1	75.7
	WOMEN AGED 25–29							
College 4+	272	731	168.8	607	1,032	70.0	52.4	70.8
College 1–3	498	986	98.0	846	1,225	44.8	66.9	80.5
High School 4	560	1,128	101.4	930	1,327	42.7	68.6	85.0
High School 1–3	908	1,498	65.0	1,279	1,654	29.3	80.4	90.6
Elementary or Below	1,081	1,629	50.7	1,572	1,867	18.8	79.2	87.3
	WOMEN AGED 30–34							
College 4+	607	1,222	101.3	1,070	1,559	45.7	65.3	78.4
College 1–3	824	1,416	71.8	1,192	1,626	36.4	77.6	87.1
High School 4	901	1,509	67.5	1,287	1,687	31.1	78.8	89.4
High School 1–3	1,271	1,797	41.4	1,639	1,933	17.9	87.0	92.9
Elementary or Below	1,575	1,929	22.5	2,046	2,134	4.3	87.2	90.4

[1] *See* text for discussion of comparability of 1940 and 1950 data.

and 30–34, fertility rates by educational attainment, for urban white women and ever-married women for 1940 and 1950, the percentage increase in the general and marital fertility rates and the percentages ever married. The increase in marriage among college women since 1940 has been as striking as the increase in marital fertility of this group. This subject is considered more fully in a later section (Table 11.) As noted in Table 5, among urban white "College 4+" women 20–24 years of age the proportion ever married was 25 per cent in 1940 and 44 per cent in 1950. Among comparable women of elementary school status, 58 per cent were married in 1940 and 76 per cent in 1950. It will also be noticed that by ages 30–34, the proportion ever married among urban white women of College 4+ status was 65 per cent in 1940 and 78 per cent in 1950. In the 1950 data the proportions of "College 4+" urban white women reported as ever married decrease slightly at successively later ages. However, the proportion is slightly higher for 1950 than for 1940 at all ages represented.

The impact of the increase in marriage upon the general fertility rates of women of college status has been tremendous. Thus, whereas the marital fertility rate of urban white women of "College 4+" status and 25–29 years of age increased 71 per cent, the general fertility rate of this group increased by 169 per cent. Among "College 4+" women 30–34 years of age the increase in the marital fertility rate was 46 per cent and the increase of the general fertility rate was 101 per cent.

Fertility Rates by Socio-Economic Status

Fertility Rates by Educational Attainment of the Wife. The classifications by educational attainment of the wife are based upon the question regarding highest grade in school completed. For all of the categories utilized, except the lowest, it will be understood that the woman *completed* one of the grades in the group. The category labeled "Elementary School" includes women reporting that they had never completed any of the grades as well as those completing given grades within the elementary school.

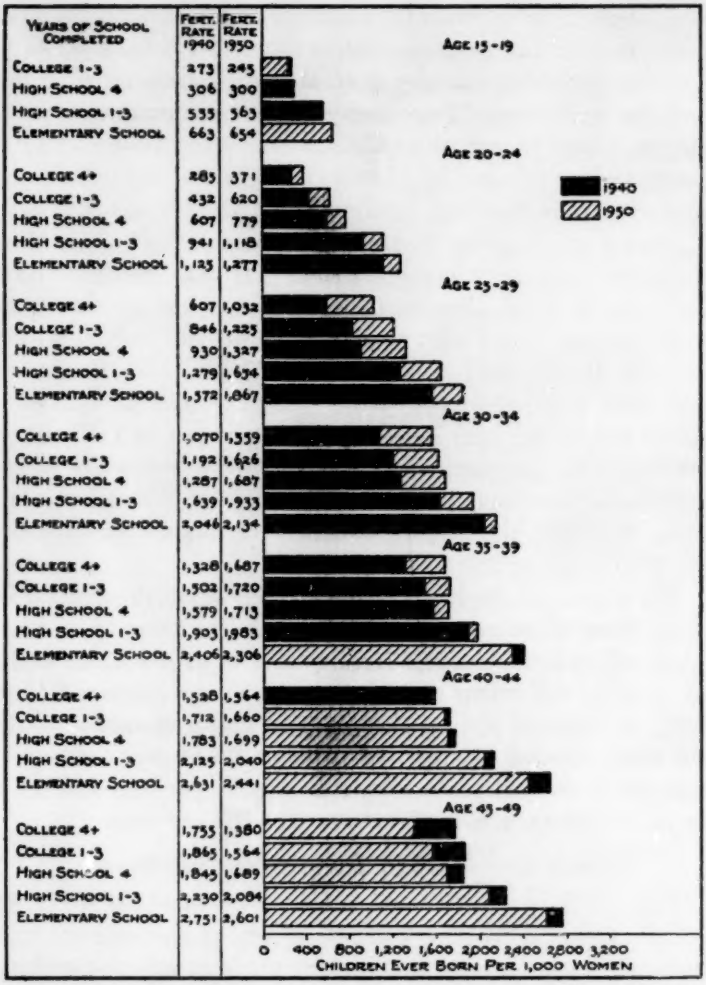
Years of School Completed
Fert. Rate 1940
Fert. Rate 1950
Age 15-19
College 1-3 273 245
High School 4 306 300
High School 1-3 535 563
Elementary School 663 654
Age 20-24
College 4+ 285 371
College 1-3 432 620
High School 4 607 779
High School 1-3 941 1,118
Elementary School 1,123 1,277
Age 25-29
College 4+ 607 1,032
College 1-3 846 1,225
High School 4 930 1,327
High School 1-3 1,279 1,634
Elementary School 1,572 1,867
Age 30-34
College 4+ 1,070 1,359
College 1-3 1,192 1,626
High School 4 1,287 1,687
High School 1-3 1,639 1,933
Elementary School 2,046 2,134
Age 35-39
College 4+ 1,328 1,687
College 1-3 1,502 1,720
High School 4 1,579 1,713
High School 1-3 1,903 1,983
Elementary School 2,406 2,306
Age 40-44
College 4+ 1,528 1,564
College 1-3 1,712 1,660
High School 4 1,783 1,699
High School 1-3 2,125 2,040
Elementary School 2,631 2,441
Age 45-49
College 4+ 1,735 1,380
College 1-3 1,865 1,564
High School 4 1,845 1,689
High School 1-3 2,230 2,084
Elementary School 2,751 2,601
1940
1950
0 400 800 1,200 1,600 2,000 2,400 2,800 3,200
Children Ever Born Per 1,000 Women

Fig. 3. Children ever born per 1,000 ever-married white women in 1950 and native-white women in 1940, by age and number of years of school completed by the wife. Urban areas of the United States as defined in 1940 and 1950.

Fertility rates among ever-married white women of given age and educational attainment are presented in Figures 3–5 for the urban, rural-nonfarm and rural farm areas, respectively.

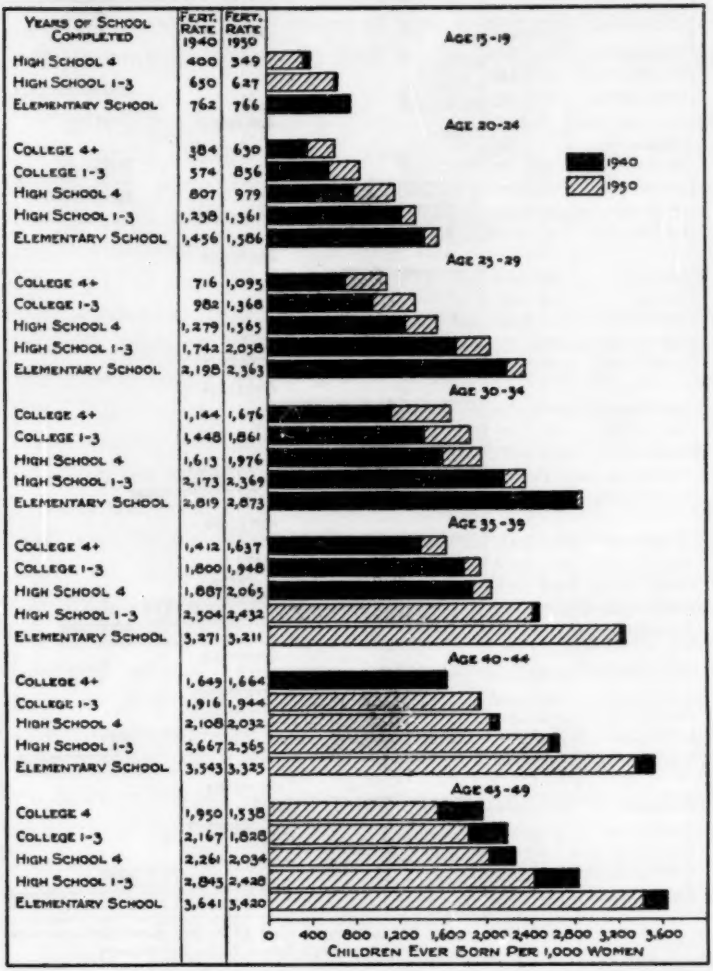
Years of School Completed
Fert. Rate 1940
Fert. Rate 1950
Age 15-19
High School 4 400 349
High School 1-3 650 627
Elementary School 762 766
Age 20-24
College 4+ 384 630
College 1-3 574 856
High School 4 807 979
High School 1-3 1,238 1,361
Elementary School 1,456 1,586
Age 25-29
College 4+ 716 1,095
College 1-3 982 1,368
High School 4 1,279 1,565
High School 1-3 1,742 2,038
Elementary School 2,198 2,363
Age 30-34
College 4+ 1,144 1,676
College 1-3 1,448 1,861
High School 4 1,613 1,976
High School 1-3 2,173 2,369
Elementary School 2,819 2,873
Age 35-39
College 4+ 1,412 1,637
College 1-3 1,800 1,948
High School 4 1,887 2,065
High School 1-3 2,504 2,432
Elementary School 3,271 3,211
Age 40-44
College 4+ 1,649 1,664
College 1-3 1,916 1,944
High School 4 2,108 2,032
High School 1-3 2,667 2,565
Elementary School 3,543 3,325
Age 45-49
College 4 1,950 1,538
College 1-3 2,167 1,828
High School 4 2,261 2,034
High School 1-3 2,845 2,428
Elementary School 3,641 3,420
1940
1950
0 400 800 1,200 1,600 2,000 2,400 2,800 3,200 3,600
Children Ever Born Per 1,000 Women

Fig. 4. Children ever born per 1,000 ever-married white women in 1950 and native-white women in 1940, by age and number of years of school completed by the wife. Rural nonfarm population of the United States as defined in 1940 and 1950.

Despite the fact that the 1940–1950 *percentage increases* in fertility among ever-married women under 40 years of age tended to be related directly with educational attainment, the

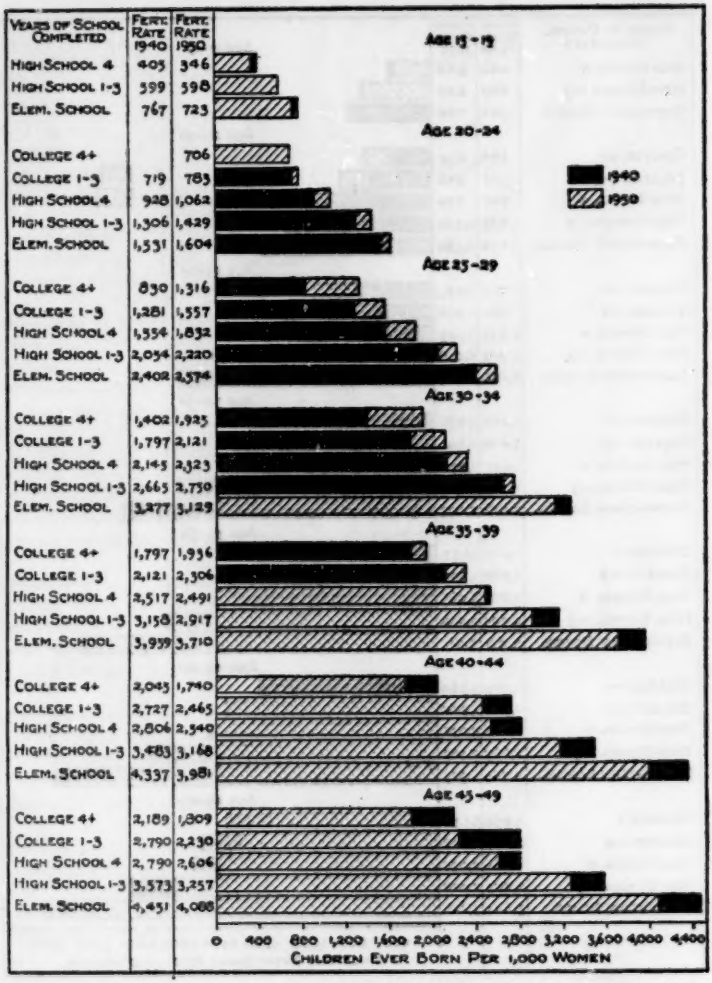
Years of School Completed
Fertility Rate 1940
Fertility Rate 1950
Age 15-19
High School 4 405 346
High School 1-3 599 598
Elem. School 767 723
Age 20-24
College 4+ 706
College 1-3 719 783
High School 4 928 1,062
High School 1-3 1,306 1,429
Elem. School 1,531 1,604
Age 25-29
College 4+ 830 1,316
College 1-3 1,281 1,557
High School 4 1,554 1,832
High School 1-3 2,034 2,220
Elem. School 2,402 2,574
Age 30-34
College 4+ 1,402 1,925
College 1-3 1,797 2,121
High School 4 2,145 2,323
High School 1-3 2,665 2,730
Elem. School 3,277 3,129
Age 35-39
College 4+ 1,797 1,936
College 1-3 2,121 2,306
High School 4 2,517 2,491
High School 1-3 3,158 2,917
Elem. School 3,939 3,710
Age 40-44
College 4+ 2,043 1,740
College 1-3 2,727 2,465
High School 4 2,806 2,540
High School 1-3 3,483 3,168
Elem. School 4,337 3,981
Age 45-49
College 4+ 2,189 1,809
College 1-3 2,790 2,230
High School 4 2,790 2,606
High School 1-3 3,573 3,257
Elem. School 4,451 4,088
1940
1950
0 400 800 1,200 1,600 2,000 2,400 2,800 3,200 3,600 4,000 4,400
Children Ever Born Per 1,000 Women

Fig. 5. Children ever born per 1,000 ever-married white women in 1950 and native-white women in 1940, by age and number of years of school completed by the wife. Rural farm population of the United States as defined in 1940 and 1950.

1950 fertility rates themselves were, with minor exceptions, still inversely related to educational attainment at all ages and within each type of community. Among urban white ever-

married women 25–39 years of age, this inverse relation was not so sharp in 1950 as in 1940 but it was rather consistently manifested.

Figure 3 points up the persistence of lowest lifetime fertility rates among urban white "College 4+" wives despite the relatively high percentage increases in the fertility of this group during 1940–1950. However, the conspicuous extent to which fertility differentials by education narrowed during the decade, especially at ages 30–39, is also pointed up in the same chart.

It is possible to present fertility rates by educational attainment in terms of children ever born per 1,000 women (under the assumption that all never-married women are childless), per 1,000 ever married women, and per 1,000 women "married once—husband present."[6] The magnitude of these rates increase in the order mentioned.

Since the 1940–1950 percentage increases in proportions married were larger among college women than among women of lower educational attainment the narrowing of fertility differentials among urban whites was more pronounced among all women than among the "ever married" or "married once—husband present" groups. The trend in the general fertility rates, of course, is affected by changes in proportions married as well as by changes in marital fertility. To put the situation in a somewhat broader context, one might say that since 1940 we have not only witnessed substantial increases in number and proportion of women going to college, but also a marked increase in marriage rates among college women under 30 years of age, and marked increases in marital as well as general fertility rates of women who have attended college.

Fertility Rates by Occupation Group of the Husband, 1910 1940, and 1950. Fertility rates by occupation group of the husband are presented for the "married once–husband present" groups for 1910, 1940, and 1950 in Figures 6–8. Despite the previously described relatively high percentage increase in the

[6] U. S. Bureau of the Census: FERTILITY, Special Report, P-E No. 5C, *Ibid.*, Tables 20–23.

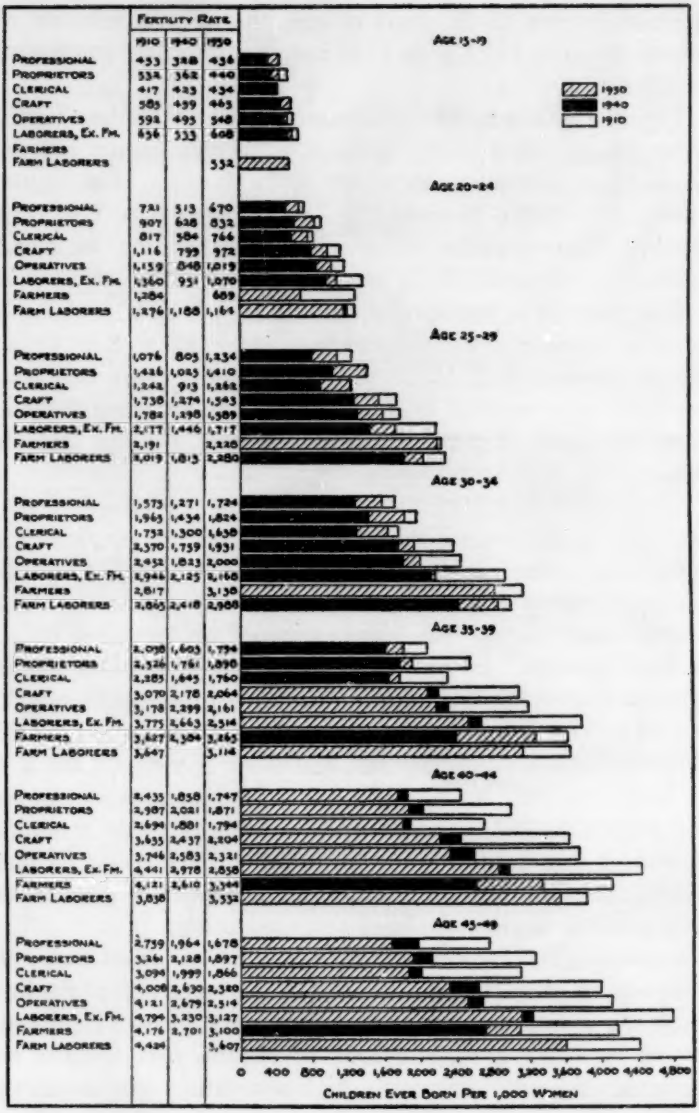

Fig. 6. Children ever born per 1,000 white women in 1950 and native-white women in 1940 and 1910 (married once—husband present), by age of wife and occupation group of the husband. Urban areas of the United States as defined in 1910, 1940, and 1950.

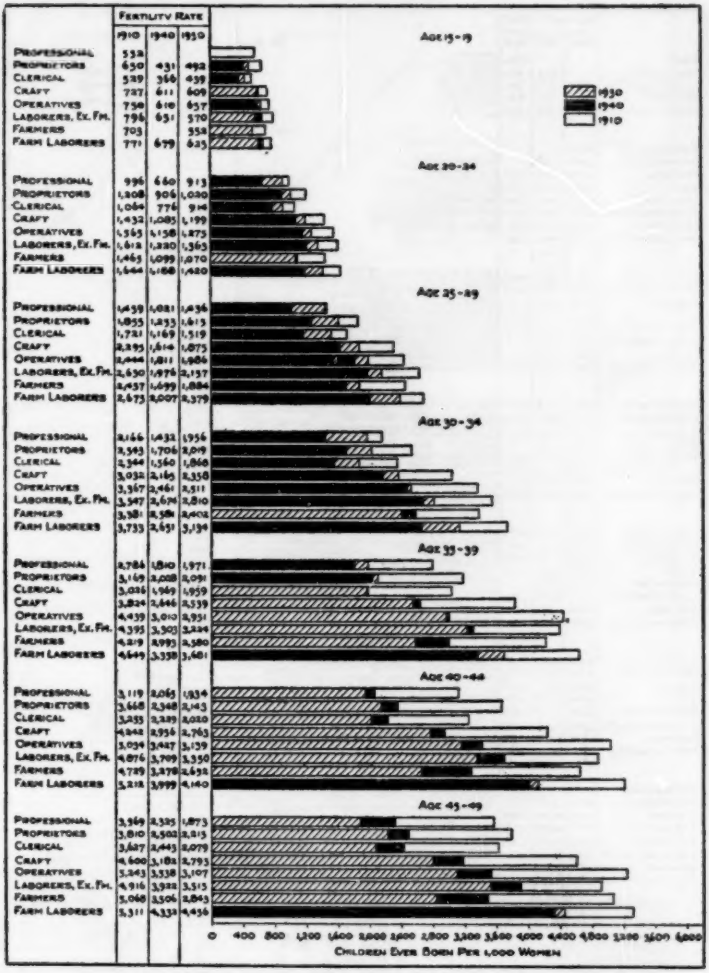

Fig. 7. Children ever born per 1,000 white women in 1950 and native-white women in 1940 and 1910 (married once—husband present), by age of wife and occupation group of the husband. Rural nonfarm population of the United States as defined in 1910, 1940, and 1950.

fertility of wives of professional men, this occupation group was still characterized by lowest fertility rates at most of the ages represented. Exceptions among the urban whites were

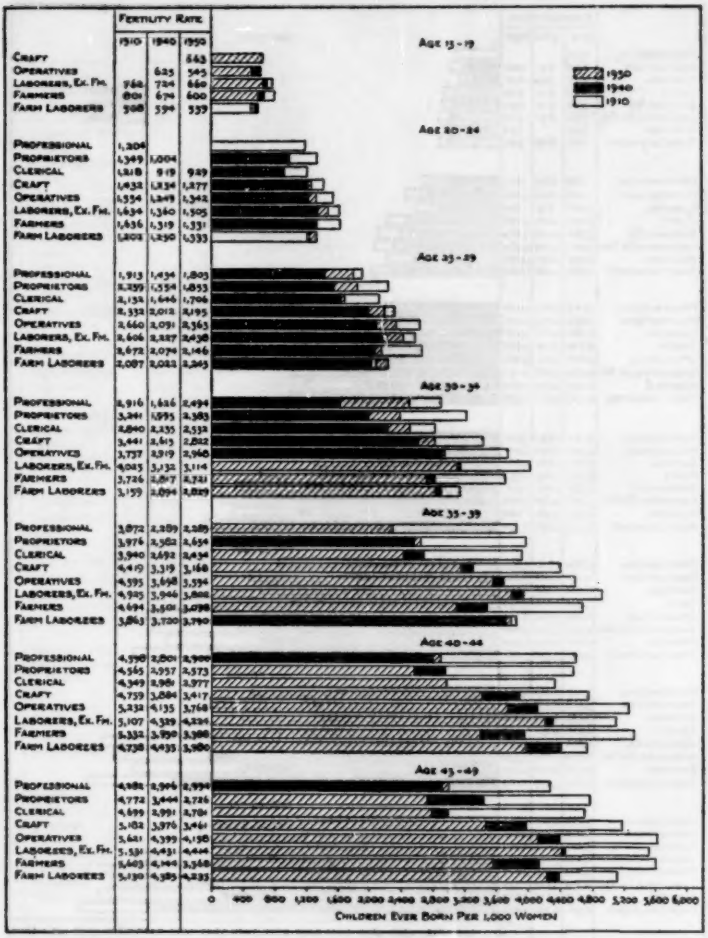

Fig. 8. Children ever born per 1,000 white women in 1950 and native-white women in 1940 and 1910 (married once—husband present), by age of wife and occupation group of the husband. Rural farm population of the United States as defined in 1910, 1940, and 1950.

those for wives aged 15–19 and 30–34 in which cases the clerical workers exhibited the lowest fertility rates.

The patterns of change in age-specific fertility rates of urban whites by occupation since 1910 and by education since 1940

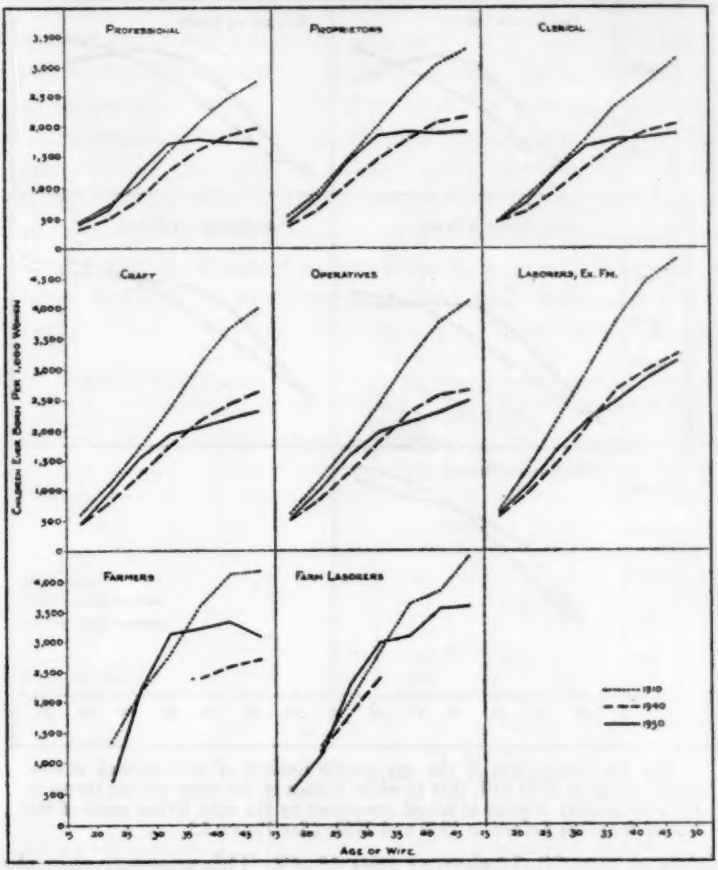

Fig. 9. Comparison of the age-specific fertility of native-white women (married once—husband present) in 1910 and 1940 with that of white women of the same marital status in 1950; by occupation group of the husband. Urban areas of the United States as defined in 1910, 1940, and 1950. (*See* Figure 6.)

are depicted in another form in Figures 9 and 10, respectively. In Figure 9 the rather universally high position of the fertility rates in 1910 is emphasized for each occupational group. Of special interest, however, is the fact that in 1950 the fertility rate for urban white wives of professional men was actually

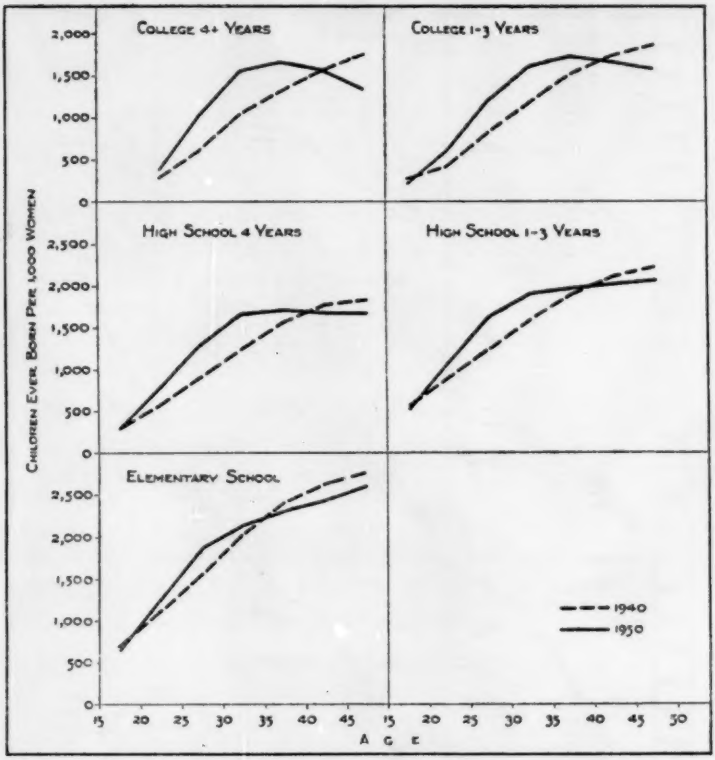

Fig. 10. Comparison of the age-specific fertility of ever-married native-white women in 1940 with that of white women of the same marital status in 1950, by number of years of school completed by the wife. Urban areas of the United States as defined in 1940 and 1950. (*See* Figure 3.)

higher at ages 30–34 than at ages 45–49. This suggests that the average size of completed family for the urban white professional class may easily increase during the 1950–1960 decade.

Fertility Differentials Within Rural Areas. For purposes of simplicity the preceding discussion has been restricted largely to urban whites. Because of certain basic similarities it is needless to replicate the discussion for the rural areas. In general the inverse relation of fertility to educational and occupational status holds within rural nonfarm and rural-farm areas. The tendency for fertility to be lowest in urban areas, inter-

mediate in rural nonfarm areas, and highest in rural-farm areas tends to hold within specific occupational groups.[7] The narrowing of the differentials in fertility during 1940–1950 was more pronounced in urban areas than in either type of rural area.

Attention may also be called to the fact that among the rural-farm whites, age-specific fertility rates tend to be higher for farm laborers than for farm owners and managers. However, the age-specific fertility rates of farm laborers tend to be lower than those of "laborers except farm and mine." It seems possible that this latter situation arises partly from selective factors. Unskilled laborers residing on a "farm" but working at

Table 6. Children ever born per 1,000 nonwhite women (married once—husband present), by age, occupation group of husband, and residence. United States, 1950.[1]

Occupation	15–19	20–24	25–29	30–34	35–39	40–44	45–49
	URBAN						
Professional	*	*	1,242	1,560	1,426	1,685	*
Proprietors	*	*	1,184	1,891	1,730	2,150	2,309
Clerical	*	1,197	1,536	1,591	1,857	1,656	1,719
Craftsmen	932	1,310	1,583	2,063	2,292	2,418	2,561
Operatives	888	1,310	1,816	2,106	2,196	2,485	2,550
Service Workers	738	1,350	1,464	1,658	1,716	2,015	2,266
Laborers, Exc. Farm	952	1,498	1,855	1,974	2,324	2,424	2,670
	RURAL NONFARM						
Craftsmen	*	*	*	2,987	*	*	*
Operatives	951	1,641	2,735	3,317	3,844	3,290	3,557
Laborers, Exc. Farm	910	1,853	2,851	3,210	3,742	4,131	3,833
Farm Laborers	883	1,849	2,446	3,829	4,174	3,649	3,759
	RURAL FARM						
Farmers	1,090	2,080	3,237	4,464	5,070	5,382	5,413
Farm Laborers	838	1,786	2,740	3,286	4,074	*	*

* Rate not shown if based on fewer than 4,000 cases in the inflated sample.
[1] Adapted from U.S. Census Bureau: Fertility, *Special Report*, P.E. No. 5C, 1955, Table 29.

[7] The rural-nonfarm families differ from the rural-farm in that the latter lived on a "farm," according to the census definition. Persons may have the occupation of farming without living on a farm and persons living on a farm may have a nonfarm occupation.

something else as a major occupation may be a select group with respect to high fertility.

Class Differentials in Fertility Among the Nonwhites. Owing to the heavy concentration of the nonwhites in the "lower" occupational and educational classes, (especially in the rural-farm areas) a 3.33 per cent sample is not sufficient for an adequate analysis of the "upper" classes.[8] (Tables 6–7.)

In general, the inverse relation of fertility to educational and occupational attainment is observed for nonwhites as well as whites within the urban, rural-nonfarm, and rural-farm areas. Among the nonwhites fertility appears to be more sharply re-

Table 7. Children ever born per 1,000 nonwhite ever-married women, by age, years of school completed by woman, and residence, United States. 1950.[1]

Education of Wife	15–19	20–24	25–29	30–34	35–39	40–44	45–49
	URBAN						
College 4+	*	581	854	1,071	1,046	1,173	1,239
College 1–3	*	927	1,165	1,335	1,263	1,370	1,901
High School 4	584	1,090	1,308	1,462	1,494	1,645	1,852
High School 1–3	924	1,417	1,798	1,955	1,864	2,129	2,274
Elementary School 8	959	1,453	1,747	1,907	1,955	2,009	2,275
Elementary Under 8	958	1,496	1,914	1,981	2,123	2,253	2,350
	RURAL NONFARM						
High School 4	*	1,399	1,853	*	*	*	*
High School 1–3	896	1,537	2,328	2,830	2,877	3,145	*
Elementary School 8	926	1,747	2,535	2,805	3,598	2,907	3,277
Elementary Under 8	1,085	1,882	2,684	3,164	3,421	3,530	3,253
	RURAL FARM						
High School 4	*	1,194	1,857	*	*	*	*
High School 1–3	866	1,606	2,753	3,465	4,648	4,636	*
Elementary School 8	931	2,065	3,194	3,953	4,222	4,248	4,545
Elementary Under 8	952	2,081	3,089	4,131	4,604	4,881	4,984

* Rate not shown if based on fewer than 4,000 cases in the inflated sample.

[1] Adapted from U.S. Bureau of the Census: Fertility, *Special Report*, P.E. No. 5C, 1955, Table 22.

[8] In the published reports on fertility the numbers are inflated to the sizes of the relevant populations. However, significance is determined by sample size. Fertility rates were not computed for cells having fewer than 4,000 cases after the inflation was done.

lated to educational attainment than to occupation group. To a less degree a similar situation was observed for the whites. There may be several reasons for this. Education relates to the wife rather than to the husband. In the nature of the case the highest grade completed is directly amenable to precise quantitative gradation. Finally, highest educational attainment is a virtually stable characteristic; it does not change in time as does occupational class of the individual.

Distribution of Women by Number of Children Ever Born. The previous discussion has been restricted to *average* fertility rates among women of given age. Differentials in the distributions of women by number of children ever born are also of interest. Without attempting to retrace the pattern of analysis just presented, a few of the highlights with respect to distributions of children in relation to socio-economic status in 1940 and 1950 may be noted. First of all, the 1940–1950 *decrease* in fertility rates of women of completed fertility has been due in considerable measure to decrease in proportion of large families, say families with five or more children. The *increases* in fertility of women under age 40 during 1940–1950, however, have not accrued from increases in proportions of families with five or more children, but from increases in proportion with two, three, and four children.

Figure 11 presents selected distributions of urban, white, ever-married women in 1940 and 1950, by number of children ever born, according to age and educational attainment of the women. The data are shown for three age groups: 25–29, 35–39, and 45–49. In a previous section it was noted that the highest percentage increase in fertility, especially for the "upper" socio-economic classes, was that exhibited by the 25–29 age group. It was also noted that the 45–49 age group, i.e., the women of recently completed fertility, had rather uniformly lower fertility in 1950 than did women of similar age in 1940. Accordingly, these age groups, together with the intermediate one (35–39), were selected for exhibition in Figure 11.

That there was a 70 per cent increase during 1940–1950 in

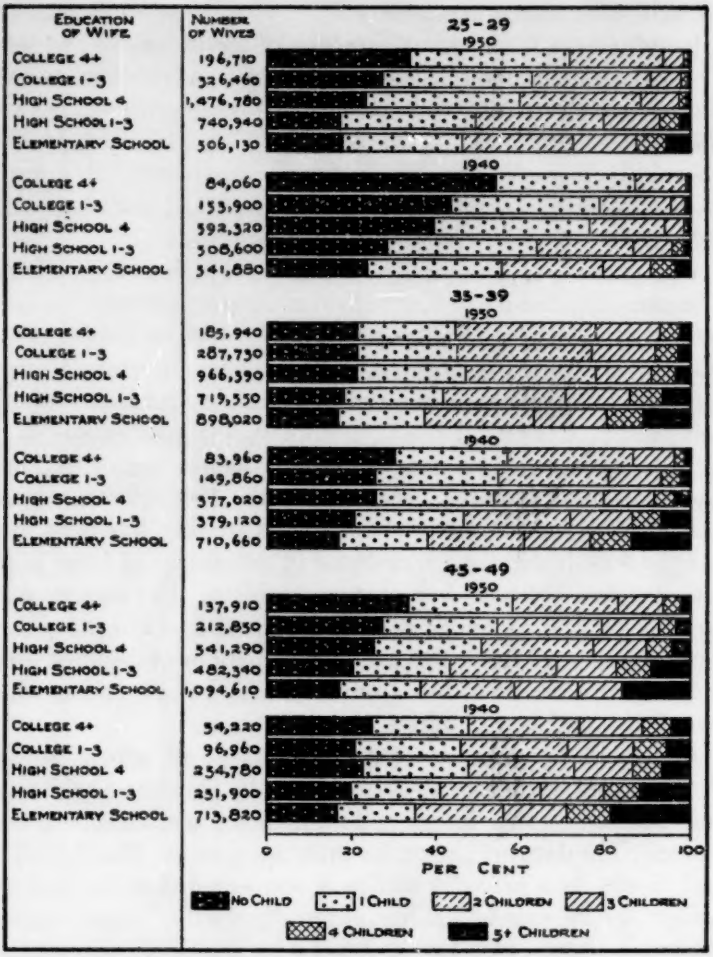

Fig. 11. Percentage distributions by number of children ever born among urban white, ever-married women of specified age and educational attainment. United States, 1940 and 1950.

the fertility rate of "College 4+" ever-married urban white women 25–29 years of age has already been noted. In 1940 over half (54 per cent) of the women of this class had not borne a child and an additional one-third had borne only one

child. Thus, only about 13 per cent had two or more children. In 1950, however, only about one-third (34 per cent) were childless, 38 per cent had borne one child, and 28 per cent had borne two or more children. A somewhat similar situation is found for the "College 1–3" women.

Among ever-married urban white women of elementary school status and 25–29 years of age, the proportion reporting "no live births" was 24 per cent in 1940 and 18 per cent in 1950. About 45 per cent in 1940 and 53 per cent in 1950 reported two or more children.

As already indicated, the women who were 45–49 years of age at the time of the 1950 Census were affected very little, if at all, by the increases in fertility during the 'forties. On the contrary, women of this age in 1950 had lower fertility than women of the same age in 1940. As already stated, the *decreases* in *completed fertility* were directly related to socio-economic status.

Childlessness. The proportions childless among couples of given age, color, residence, and socio-economic status constitute important features of distributions by number of children ever born. As noted above, the proportion childless was generally higher in 1950 than in 1940 for women aged 40 and over. This reflects in large part, the pre-1940 declines in fertility.[9] However, at ages 35–39, the proportions childless were generally smaller in 1950 than in 1940. Among urban white ever-married women 35–39 years of age, the proportions childless were smaller in 1950 than in 1940 for each educational class except "elementary school."

Another favorable prognosis for future increase in size of completed family may be noted. The proportion childless among ever-married urban white women 25–29 years of age in 1950 was no higher than that for women 45–49 years of age and of comparable residence, education, and marital status. As expected, the prevalence of childlessness by socio-economic

[9] It is recognized that the proportions of reported childlessness in 1940 generally are too low because of biases explained in another section of this report.

status is consistent with the pattern of fertility differentials. Thus, among urban white ever-married women of completed fertility in 1950 (45–49 years of age) the proportion childless extended from 14.8 per cent for the "elementary, less than 8 years" group to 33.3 per cent for the "College 4+" group. The corresponding range at ages 35–39, was from 16.0 to 21.5 reflecting again the trend toward convergence of fertility rates by educational attainment.[10]

By occupational group of the husband, the proportion childless for urban white wives (married once–husband present) 45–49 years of age ranged from 13.2 for the unskilled "laborers, except farm and mine" to 25.0 per cent for the professional class. At ages 35–39, the percentage childless ranged from 11.9 for wives of farmers to 18.0 for wives of professional men. The percentages were 20.1 for the "clerical, sales and kindred workers" and 21.1 for the "service workers, including private household."[11]

The data on childlessness of urban nonwhite women are of special interest. Previous analyses relating to fertility ratios in the 1930 Census data,[12] to number of children ever born as reported in private studies[13] and in the 1940 Census data[14] indicate relatively high proportions childless among Negro marriages in urban areas.

Table 8 presents skeleton data for 1950 on percentages childless by age, residence and color. In the first two columns the data are shown for ever-married women 40–44 years of age regardless of duration of marriage. In the last two columns they

[10] U. S. Bureau of the Census: FERTILITY, Special Report, P-E. No. 5C, *Ibid*, Table 20.

[11] *Ibid*, Table 28.

[12] Notestein, Frank W.: Differential Fertility in the East North Central States. The Milbank Memorial Fund *Quarterly*, April, 1938, XVI, No. 2, pp. 173–191.

[13] Kiser, Clyde V.: Fertility of Harlem Negroes. The Milbank Memorial Fund *Quarterly*, July, 1935, XIII, No. 3, pp. 273–285.

———: Birth Rates Among Rural Migrants in Cities. The Milbank Memorial Fund *Quarterly*, October, 1938, XVI, No. 4, pp. 369–391.

Beebe, Gilbert W.: Differential Fertility by Color for Coal Miners in Logan County, West Virginia. The Milbank Memorial Fund *Quarterly*, April, 1941, XIX, No. 2, pp. 189–195.

[14] *See* reports listed under reference 4.

are shown for women "once married–husband present" 35–39 years of age and married 15–19 years. Among urban ever-married women of recently completed fertility, approximately one-fifth of the whites and one-third of the nonwhites reported no live births. Relatively smaller differentials by color are seen for the rural-nonfarm and rural-farm areas.

On the assumption that the higher proportion of childlessness among the nonwhites might accrue partly from more frequent (if less formal) dissolution of marriage the data were also examined with age and duration of marriage held constant and with the analysis restricted to the "married once–husband present" group. This type of restriction lowered all percentages of childlessness, but the differentials by color persisted and were actually increased on a relative basis.

This whole question of the prevalence of childlessness in relation to color, residence, and other factors will be considered more fully in the forthcoming monograph on fertility. It may be noted here, however, that the proportions childless among the urban nonwhite females of given age increase with educational attainment. Thus, at ages 40–44 the percentages extend from 31.3 for the "elementary, less than 8" group to 48.1 for the "College 4+" group.

Table 8. Comparison of percentages childless among white and nonwhite women of given residence, age, marital status, and duration of marriage. 1950.[1]

Residence	Percentages Childless			
	Ever Married Women 40–44 Years of Age		Women 35–39 Years of Age and Married 15–19 Years. Married Once Husband Present	
	White	Nonwhite	White	Nonwhite
Total U.S.	18.9	29.6	10.0	20.2
Urban	20.7	33.7	11.0	25.4
Rural Nonfarm	17.3	24.9	9.4	16.7
Rural Farm	12.4	15.5	6.9	9.4

[1] Adapted from U.S. Bureau of the Census. Fertility, *Special Report*, P.E. No. 5C., Washington, Government Printing Office, 1955, Tables 18, 19, 20, and 22.

Fertility Ratios

Fertility Ratios by Education of the Wife. Despite their limitations, the fertility ratios (relating as they do only to conditions during the preceding five years) express current fertility much more explicitly than do the fertility rates concerning total number of children ever born. It is this feature which partially accounts for an apparently greater degree of narrowing of the differentials in fertility ratios than in fertility rates during the 1940–1950 decade.

Table 9. Own children under 5 per 1,000 ever married white and nonwhite women by age, number of school years completed, and residence. United States, 1950.[1]

Education of Wife	White					Nonwhite				
	15–19	20–24	25–29	30–34	35–39	15–19	20–24	25–29	30–34	35–39
	Urban									
College 4+	*	337	856	861	527	*	521	565	575	249
College 1–3	178	573	889	755	431	*	812	584	465	264
High School 4	275	713	879	662	380	527	853	664	406	257
High School 1–3	522	927	842	562	321	761	980	652	381	254
Elementary School 8	549	939	841	569	320	833	858	635	387	232
Elementary Under 8	589	1,004	904	614	378	773	875	656	425	283
	Rural Nonfarm									
College 4+	*	520	894	950	515	*	*	*	*	*
College 1–3	*	776	973	776	500	*	*	*	*	*
High School 4	322	887	985	677	417	*	1,231	1,010	*	*
High School 1–3	586	1,116	943	588	353	807	1,136	962	671	388
Elementary School 8	624	1,177	935	635	442	791	1,120	949	703	514
Elementary Under 8	761	1,235	1,084	783	528	896	1,195	963	772	532
	Rural Farm									
College 4+	*	622	986	948	689	*	*	*	*	*
College 1–3	*	744	1,129	938	513	*	*	*	*	*
High School 4	306	976	1,124	749	463	*	1,033	1,088	*	*
High School 1–3	533	1,142	1,029	693	428	781	1,193	1,262	1,042	828
Elementary School 8	613	1,206	1,136	749	514	855	1,417	1,268	953	693
Elementary Under 8	623	1,251	1,211	874	679	798	1,372	1,242	1,008	749

* Rate not shown if based on fewer than 4,000 cases in the inflated sample.

[1] Adapted from U.S. Census Bureau: Fertility, *Special Report*, P.E. No. 5C, 1955, Tables 44–45.

Among urban white ever-married women (or among the married once–husband present) the fertility ratios were consistently higher for those reporting "less than 8 years" in elementary school than for any other educational class at each age group under 30. (Table 9.) However, within each of the three age groups in the 30–44 range, the fertility ratios were consistently higher for the "College 4+" group than for any other educational class. In fact, within the 35–39 age group there is a virtually direct association of fertility ratio to educational attainment of ever-married urban white women.

It should be pointed out, however, that there is a spurious element in the tendency for fertility ratios to be relatively high for "College 4+" women. Since "College 4+" women in the nature of the case marry later than those of lower educational attainment, they also start having their families later. The fact that a college graduate has more children under 5 than does a woman of lower educational attainment does not necessarily mean a higher total fertility. This is illustrated by the fact that among urban ever-married white women 35–39 the college graduates had the *highest fertility ratio* but the *lowest fertility rate* in 1950.[15]

In the Census Bureau's *Special Report,* fertility ratios by educational attainment are given for four marital status categories: Total women, ever-married women, women married once–husband present, and other ever-married women.[16] The

[15] The figures adapted from the U. S. Bureau of the Census: FERTILITY, Special Report, P-E No. 5C, pp. 71 and 167, are as follows:

EDUCATION	CHILDREN EVER BORN PER 1,000 WOMEN		CHILDREN UNDER FIVE PER 1,000 WOMEN	
	Rate	Rank	Rate	Rank
College 4+	1,746	6	527	1
College 1–3	1,791	4	431	2
High School 4	1,781	5	380	3
High School 1–3	2,034	3	321	5
Elementary 8	2,173	2	320	6
Elementary Under 8	2,630	1	378	4

[16] U. S. Bureau of the Census: FERTILITY, *Ibid.,* Table 34.

last two categories are simply subdivisions of the "ever married." As with children ever born, the fertility ratios for the "total women" are computed simply by adding single women to the population base of "ever married" women and assuming that the single women had no children under five years of age. This assumption, of course, is more justified for the whites than for the nonwhites.

Within each education group, fertility ratios are generally highest for the "married once–husband present" group. At ages 15–19 and 20–24 the lowest fertility ratios are those for "total women" because the single women constitute significant proportions of the total at these ages. However, at ages 25 and over the lowest ratios are those for the "other women ever married" groups—i.e., the "ever married" other than the "married once–husband present."

The fertility ratios (like the fertility rates) by occupation group of the husband are given only for the "married once—husband present" women. (Table 10.) Among urban white wives 25–29, there is only a narrow range of variation in fertility ratios by occupation group. If the somewhat anomalous groups of farmers and farm laborers living in urban areas are excluded, the highest rate in urban areas (972) is that for unskilled "laborers, except farm and mine" and the lowest rate (883) is that for "clerical, sales and kindred workers." The rate for the professional class is 931. At ages 30–34 and 35–39 the fertility ratios for the professional class actually exceed those for unskilled laborers.

As in the case of the fertility rates, the fertility ratios at each educational and occupational level increase as one proceeds from urban to rural nonfarm to rural farm areas. Within the rural nonfarm as within the urban areas, the fertility ratios tend to be higher for the College 4+ than for any other educational class of white women within the 30–44 age spans. A frequent pattern is that of relatively high fertility ratios at the lowest and highest educational levels and lowest fertility ratios for the High School 1–3 or High School 4 group.

The relation of residence and color to fertility ratios may be summarized briefly by stating that within urban areas the ratios for nonwhites were lower than those for whites within the 25–44 age groups. Within rural-nonfarm and rural-farm areas

Table 10. Own children under 5 per 1,000 white and nonwhite women (married once—husband present), by age, occupation group of husband, and residence, United States, 1950.[1]

Occupation Group of the Husband	White					Nonwhite				
	15–19	20–24	25–29	30–34	35–39	15–19	20–24	25–29	30–34	35–39
	URBAN									
Professional	376	615	931	852	498	*	*	755	576	386
Proprietors	424	743	914	722	405	*	*	530	610	357
Clerical	386	704	883	709	413	*	962	771	515	331
Craftsmen	442	861	926	652	373	888	993	687	544	340
Operatives	525	889	928	646	379	815	968	808	549	342
Service Workers	438	847	939	635	386	691	1,009	685	438	264
Laborers, Exc. Farm	568	914	972	700	451	798	1,122	793	470	412
Farmers	*	816	941	946	476	*	*	*	*	*
Farm Laborers	493	924	1,091	944	577	*	*	*	*	*
	RURAL NONFARM									
Professional	*	802	1,021	866	521	*	*	*	*	*
Proprietors	464	883	943	675	413	*	*	*	*	*
Clerical	396	820	957	697	429	*	*	*	*	*
Craftsmen	581	1,038	978	685	422	*	*	*	739	*
Operatives	614	1,079	1,030	693	490	834	1,226	1,103	894	661
Service Workers	*	1,055	934	663	448	*	*	*	*	*
Laborers, Exc. Farm	539	1,153	1,051	777	550	807	1,310	1,191	872	664
Farmers	455	919	1,034	748	512	*	*	*	*	*
Farm Laborers	578	1,157	1,173	857	595	773	1,305	1,025	900	793
	RURAL FARM									
Professional	*	*	985	874	369	*	*	*	*	*
Proprietors	*	*	1,054	740	475	*	*	*	*	*
Clerical	*	777	1,028	831	490	*	*	*	*	*
Craftsmen	663	1,038	1,094	724	502	*	*	*	*	*
Operatives	479	1,109	1,110	794	572	*	*	*	*	*
Laborers, Exc. Farm	605	1,240	1,129	716	639	*	*	*	*	*
Farmers	539	1,126	1,163	813	527	988	1,455	1,417	1,193	889
Farm Laborers	484	1,083	1,172	843	648	704	1,294	1,309	826	588

* Rate not shown if based on fewer than 4,000 cases in the inflated sample.
[1] Adapted from U.S. Census Bureau: Fertility, *Special Report*, P.E., No. 5C, Tables 48–49.

the ratios for nonwhites tended to surpass those for whites of similar age and education or occupation.

Within most age groups within the rural nonfarm areas, there were too few nonwhite women of college status to afford reliable fertility ratios and the data were even more meagre in this respect in the rural-farm areas. Within the urban areas the nonwhites of college attainment exhibited relatively high fertility ratios after age 30 in comparison with groups of lower education. Since data already discussed have also indicated relatively high proportions childless among the nonwhite wives of college status, it is apparent that the relatively high fertility ratios of "College 4+" women tend to indicate relatively late ages at getting a family started rather than relatively large number of total progeny.

Proportions Ever Married by Age and Educational Status. Since single women as well as ever-married women in the 1950 Census fertility sample tabulations were classified by educational attainment, it was possible to compute percentages ever-married by this variable. This could also be done from the 1940 Census data. Table 11 presents percentages ever married by residence, age, and educational attainment for native-white women in 1940 and white women in 1950.

The increases in proportions married at young ages are especially noteworthy among the college graduates. Thus in 1940 the proportions ever-married among "College 4+" urban women were about one-fourth for the 20–24 age group, about one-half for the 25–29 age group, and two-thirds for the 30–34 age group. In 1950 the comparable proportions were respectively, 44 per cent, 71 per cent and 78 per cent.

The differentials by educational status in the proportions ever married within certain age groups underwent some contraction during the decade. Thus in 1940 the proportions ever married among urban native-whites 25–29 years of age extended from 52 per cent for the "College 4+" group to 79 per cent for the "Elementary" group. In 1950 the corresponding range was from 71 to 87 per cent.

Table 11. Proportions ever married among native-white women in 1940 and white women in 1950, according to age, residence, and education of the woman.[1]

Age and Years of School Completed by Woman	1940			1950		
	Urban	Rural Nonfarm	Rural Farm	Urban	Rural Nonfarm	Rural Farm
15–19						
College 4+	*	*	*	13.5	*	*
College 1–3	4.6	5.9	2.8	6.6	12.9	10.1
High School 4	8.6	15.2	12.7	17.2	30.3	27.7
High School 1–3	7.0	11.5	9.3	12.9	18.0	11.6
Elementary or Below	13.9	21.8	19.3	20.3	25.9	20.2
20–24						
College 4+	24.9	22.9	19.6	44.3	49.8	48.6
College 1–3	28.4	33.7	21.6	41.9	57.6	57.9
High School 4	40.1	55.6	49.0	63.5	78.4	74.1
High School 1–3	58.8	76.6	70.0	78.9	88.3	83.9
Elementary or Below	58.1	73.6	67.3	75.7	83.4	75.4
25–29						
College 4+	52.4	56.0	47.2	70.8	80.4	78.4
College 1–3	66.9	74.6	67.2	80.5	89.7	89.1
High School 4	68.6	82.1	79.2	85.0	92.9	91.4
High School 1–3	80.4	91.5	89.0	90.6	95.9	94.5
Elementary or Below	79.2	88.2	85.7	87.3	91.6	89.9
30–34						
College 4+	65.3	71.4	67.1	78.4	87.2	86.6
College 1–3	77.6	84.2	83.5	87.1	93.2	92.3
High School 4	78.8	88.8	87.9	89.4	95.2	94.2
High School 1–3	87.0	94.0	92.2	92.9	96.9	96.0
Elementary or Below	87.2	92.3	90.4	90.4	93.8	93.0
35–39						
College 4+	67.1	76.1	71.2	76.7	86.0	85.5
College 1–3	81.5	87.7	86.5	88.4	93.6	94.1
High School 4	82.5	90.8	91.3	89.8	94.6	95.0
High School 1–3	88.9	94.1	93.7	93.6	96.8	96.7
Elementary or Below	90.2	93.6	93.4	92.1	94.5	94.8
40–44						
College 4+	66.9	76.5	76.4	76.3	84.0	87.6
College 1–3	82.1	89.7	91.8	88.4	93.2	92.9
High School 4	84.1	91.4	94.7	89.2	94.4	96.0
High School 1–3	89.1	94.2	95.0	93.8	96.5	96.7
Elementary or Below	91.1	93.9	94.4	92.9	94.5	95.4
45–49						
College 4+	66.4	78.8	83.2	73.2	79.6	88.0
College 1–3	81.7	87.8	90.4	87.2	92.1	95.3
High School 4	85.6	90.8	94.7	89.1	94.5	95.3
High School 1–3	89.8	94.3	96.0	93.0	95.5	95.8
Elementary or Below	91.5	93.8	95.3	93.6	95.1	95.5

* Percentages not shown because of inadequate numbers.
[1] Computed from U.S. Census data for 1940 and 1950.

Somewhat contrary to expectations the increases in proportions ever married among "College 4+" women during the 1940–1950 decade were somewhat more pronounced within rural-farm than within urban and rural-nonfarm areas. Thus at ages 25–29 the percentages ever married among the whites of "College 4+" status in 1940 and 1950 were 52 and 71 per cent for the urban areas, 56 and 80 for the rural-nonfarm areas, and 47 and 78 for the rural-farm areas. Also interesting was the finding that in both 1940 and 1950, at virtually all educational levels, and at nearly all ages in the 15–40 span, the proportions ever married tended to be highest in the rural-nonfarm areas and lowest in the urban areas.

Summary

The forthcoming Census monograph will afford a broader and more intensive treatment of differential fertility data than was attempted in this preliminary report. The preliminary report, however, has pointed up the opposite nature of the 1940–1950 changes in number of children ever born among ever-married women under 35 years of age as compared with those 35 years of age and over. Among the younger women this fertility rate increased and the increase was sharpest at ages 25–29. Among the older women the rate was lower in 1950 than in 1940.

Among the younger women the 1940–1950 increases in fertility tended to be sharpest in the "upper" educational and occupational groups. Since these classes were those of lowest fertility in 1940 the 1940–1950 increases tended to diminish the range of fertility differentials by education and occupation. Nevertheless, the inverse relation of lifetime fertility to socio-economic status persisted albeit in somewhat diminished strength in 1950.

The 1940–1950 changes in *fertility ratios* by education and occupation are more drastic than the changes in total fertility rates because the former reflect more exclusively the differential increases in *current fertility*. In some age groups, particu-

larly 30–34, the highest fertility ratio for 1950 is for college graduates. However, data were adduced to indicate that at this age the "College 4+" women could have the lowest fertility rate but highest fertility ratio.

The diversity of patterns of fertility trends and differentials by age, and particularly the sharp difference between the younger and older women point up the fact that during a period of changing fertility one can never be quite up to date in the assessment of trends in differential fertility. The younger women exhibit certain new patterns of fertility differentials but one does not know what the situation of this cohort will be at the end of its childbearing period. The experience of the women 40–44 or 45–49 at the present can be observed but the 1950 Census data indicate abundantly that the sizes of their families and differentials in the sizes of their families were set in the past.

Despite the difficulties of ascertaining the full significance of trends in fertility differentials, one can, if he has sufficiently refined data and several measures of fertility available, discover the direction of the trend and a great deal more besides.

SOCIAL AND PSYCHOLOGICAL FACTORS AFFECTING FERTILITY

XXIX. INTEREST IN AND LIKING FOR CHILDREN IN RELATION TO FERTILITY PLANNING AND SIZE OF PLANNED FAMILY[1]

LOIS PRATT AND P. K. WHELPTON

ONE of the original hypotheses of the Indianapolis Study is: The stronger the interest in and liking for children the lower the proportion of couples practicing contraception effectively and the larger the planned family. This formulation was a natural outgrowth of the social situation during the depression of the 1930's. The obvious signs of economic hardship—which were accentuated among large families—together with the declining birth rate, led to the conclusion that fertility planning probably occurs primarily as a means to avoid becoming overburdened by children, and that those with the least interest in children are the most susceptible to pressures to restrict family size. Since the 1930's, however, the apparent increase in the size of planned families under much better economic conditions, and the findings of the Indianapolis Study itself (to be reviewed here briefly), have provided evidence suggestive of a positive aspect to the motivation for planning—planning for the best interest of children and family—rather than an exclusively negative type of motivation. In the light of this evidence the following formulation of the first part of the hypothesis now appears more justifiable: The stronger the interest in and liking for children the *higher* the proportion of couples practicing contraception effectively. Interest in children might be expected to have a positive influence on size of planned family, as originally hypothesized, at least among families with good resources. This partial reformulation suggests,

[1] This is the twenty-ninth of a series of reports on a study conducted by the Committee on Social and Psychological Factors Affecting Fertility, sponsored by the Milbank Memorial Fund with grants from the Carnegie Corporation of New York. The Committee consists of Lowell J. Reed, Chairman; Daniel Katz; E. Lowell Kelly; Clyde V. Kiser; Frank Lorimer; Frank W. Notestein; Frederick Osborn; S. A. Switzer; Warren S. Thompson; and P. K. Whelpton.

in turn, the advisability of viewing *both* attitudes toward children and fertility behavior within the family organization context. The influence of one element of family organization—the participation of the wife in extra-familial social activities—on her attitudes toward children and fertility behavior is examined in a paper to follow.

Other Indianapolis Study analyses suggest that a family-centered interest may serve as motivation for family planning. First, there is the finding that the maritally adjusted are more apt to plan fertility than are the maladjusted.[2] It seems reasonable to characterize the maritally adjusted as persons who give more care to the maintenance of healthy family relations than do the maladjusted. While fertility planning may contribute to family adjustment as well as grow out of it, the evidence suggests that planning usually is at least part of a tendency to attend to the effective operation of one's family. However, it does not provide conclusive proof that marital adjustment means greater interest in the family or that planning is motivated by such concern for the family.

A similar suggestion arises from the finding that those who feel personally adequate, and specifically those who are confident they can do a good job of raising children, are more apt to have large planned families than those with feelings of personal inadequacy.[3] The implication here is that women who attend closely to interpersonal relations, as measured by their evaluation of the success of their performance, will plan fertility because they believe it helps to insure good family relations.

Indianapolis data also indicate that people who think of children as a means of enhancing their own egos—for example, who feel that children owe parents appreciation for their sacrifices—are no more likely to plan small families than those

[2] Reed, Robert B.: Social and Psychological Factors Affecting Fertility. VII. The Interrelationship of Marital Adjustment, Fertility Control, and Size of Family. The Milbank Memorial Fund *Quarterly*, October, 1947, XXV, No. 4, pp. 383–425 (Reprint pp. 259–301).

[3] Westoff, Charles F. and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. XVII. The Interrelation of Fertility, Fertility Planning, and Feeling of Personal Inadequacy. The Milbank Memorial Fund *Quarterly*, July, 1952, XXX, No. 3, pp. 239–297 (Reprint pp. 741–799).

whose reaction to children is less selfish.[4] If it were assumed that only the negative motivations for fertility control were operative, it would be expected that those who were the most self-centered and least concerned about children for their own sake, would be the ones most apt to limit fertility. Since a self-centered attitude toward children is not characteristically accompanied by planning, it suggests that negative motivations are not a complete explanation for fertility planning action.

In addition, it has been found that the feeling that children interfere with personal freedom is not accompanied by fertility planning. In fact, the lack of this feeling of restraint by children tends to be directly associated with planning, suggesting the existence of a "positive" motivation behind planning.[5]

1. The Data

The data pertain to the inflated sample of 1,444 "relatively fecund" couples of the Indianapolis Study.[6] These couples

[4] Swain, Marianne and Kiser, Clyde V.: Social and Psychological Factors Affecting Fertility. XVIII. The Interrelation of Fertility, Fertility Planning and Ego-Centered Interest in Children. The Milbank Memorial Fund *Quarterly*, January, 1953, XXXI, No. 1, pp. 51–84 (Reprint pp. 801–834).

[5] Reimer, Ruth and Whelpton, P. K.: Social and Psychological Factors Affecting Fertility. XXVII. Attitudes toward Restriction of Personal Freedom in Relation to Fertility Planning and Fertility. The Milbank Memorial Fund *Quarterly*, January, 1955, XXXIII, No. 1, pp. 63–111 (Reprint pp. 1140–1187).

In contrast, little evidence of "positive" motivations for planning is revealed in a British Royal Commission study. The reasons that were given by women for using birth control are:

	Per Cent
Could not afford (more) children	38
To space pregnancies at appropriate intervals	25
Health reasons; medical advice (husband or wife)	24
Housing difficulties	16
Uncertainty due to the war	11
Parental instincts satisfied with children already born	9
Dislike of pregnancy or childbirth	5
Ties and loss of freedom	4
Difficulties of obtaining domestic assistance	1

Royal Commission on Population: Family Limitation and Its Influence on Human Fertility During the Past Fifty Years. London, His Majesty's Stationery Office, 1949, I, p. 177.

[6] All couples reporting four or more live births were classified as "relatively fecund," regardless of other circumstances. Couples with three or fewer live births were also classified as "relatively fecund" unless they knew or had good reason to believe that having a live born child was physiologically impossible during a period of at least 24 or 36 consecutive months since marriage (24 if never pregnant, 36 if

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were native white, Protestant, at least eighth grade graduates, married during 1927–1929, neither previously married, husband under 40 and wife under 30 at marriage, and residents of a large city most of the time since marriage.[7] They were interviewed between April 1, 1941 and January 31, 1942.

As in other articles in this series, four fertility planning categories are used, namely, Number and Spacing Planned, Number Planned, Quasi-Planned, and Excess Fertility.[8] They indicate the extent to which all *pregnancies* were planned, and for the large majority of couples the extent to which *live births* and *living children* were planned. A very few couples had more living children (but not pregnancies) than planned, because of twins; a somewhat larger proportion had more pregnancies (but not living children) than planned, mainly because of pregnancy wastage, but partly because of child mortality. Fertility is represented by number of live births to the couple; the fertility rate used is the number of live births per 100 couples.

Ten attitude questions for both husbands and wives are used as measures of interest in and liking for children, together with a summary index. The questions are:

1. Do you like to play with, read or talk to children?
2. Do you get tired of hearing the constant questions children ask?
3. Do you get as much "kick" from the things children say as from those grownups say?
4. How much do you enjoy taking children on outings?
5. How do you feel about seeing children's pictures in ads, store windows, etc.?
6. How does the fun you get compare with the trouble when

ever pregnant). Failure to conceive in the absence of contraception practiced "always" or "usually" during periods of the above durations was considered "good reason" for such belief.

[7] A detailed account of the sampling procedure may be found in Whelpton and Kiser: Social and Psychological Factors Affecting Fertility. v. The Sampling Plan, Selection, and Representativeness of Couples in the Inflated Sample. The Milbank Memorial Fund *Quarterly*, January, 1946, xxiv, No. 1, pp. 49–93 (Reprint pp. 163–207).

[8] Whelpton and Kiser: Social and Psychological Factors Affecting Fertility. vi. The Planning of Fertility. The Milbank Memorial Fund *Quarterly*, January, 1947, xxv, No. 1, pp. 63–111 (Reprint pp. 209–257).

children of your neighbors or friends come in and make themselves at home?

7. Frequently children get so wrapped up in their play that they forget there is anyone around. Do you find it fun just to watch them then and see what they do and say?

8. How much are you interested in hearing other people talk about their children?

9. How much did a strong liking for children encourage you to have your last child?

10. How much have you been discouraged from having more children by not being more interested in children?

The respondent answered each of these questions by checking one of five categories which ranged from "very much" to "very little" (or their equivalent). The summary index was computed for each individual by averaging the respondent's answers to eight of the ten items.[9] "Interest scores" for individuals on this index range from 3 to 9 for wives and 1 to 9 for husbands out of the possible range of 1 to 9.[10] They have been grouped in four categories, namely,

Scores:
1–5: "Little interest"
6: "Some interest"
7: "Much interest"
8–9: "Very much interest"

Two questions about attitudes concerning family size were

[9] Item 5 was excluded because it was thought to represent a rather inconsequential type of interest and to reflect the individual's reaction to advertisements. Item 10 was excluded because similar information is contained in item 9.

[10] Correlations of individual items against the summary index are as follows:

Item	*Item-to-scale r*
1	+.628
2	+.597
3	+.400
4	+.518
6	+.438
7	+.427
8	+.544
9	+.497

A Guttman scale was formed with these items with reproducibility of .76. Various other combinations of several items fail to reach higher levels of reproducibility.

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used. They are: (a) When you were married, how many children did you want? (b) if you could begin your married life over again, and the size of your family could be determined only by your liking for children, how many would you have?

When the schedules used in the Indianapolis Study were prepared in 1940 it was realized that the foregoing questions probably did not provide an adequate means of measuring interest in and liking for children. Since the Committee was not aware of a better set, the choice was between using them or omitting the hypothesis. Methodological advances made since 1940 indicate several deficiencies. A basic shortcoming is that the items do not represent one or two precise attitude dimensions. For example, the child referent varies, and is sometimes not clearly specified as being either one's own children or those of others. It would be especially useful to distinguish between attitudes toward own and other children when studying motivations for actually bearing children. Distinctions could also be made profitably between a passive liking for children and an interest in active participation with children; between liking to play with children, to "take care of" children, and to train children; between liking for children *as* children and interest in children as future adults; and between other dimensions of what has been considered in the present study a general attitude of "interest in and liking for children." In future work it would be desirable to develop scalable items for one or more such dimensions.

Another type of shortcoming is that of depending on answers

However, Borgatta and Westoff have derived a cumulative scale (H) with the items used in the summary index, excluding item 4 and adding other items. Reproducibility for that is .9624. Even using the same items, this higher rate might presumably be expected because of the greater tolerance of response error in the H technique.

Westoff and Borgatta studied the relationship between their scale of liking for children and total fertility and planned fertility. Hence the present study can be considered, in part, a test of the same hypothesis with an alternative index of the attitude variable. As will be indicated, findings based on the two techniques are similar. Borgatta, Edgar F. and Westoff, Charles F.: Social and Psychological Factors affecting Fertility. xxv. The Prediction of Total Fertility. The Milbank Memorial Fund *Quarterly*, October, 1954, XXXII, No. 4, pp. 383–419 (Reprint pp. 1087–1123); *Ibid.;* XXVI. The Prediction of Planned Fertility. The Milbank Memorial Fund *Quarterly*, January, 1955, XXXIII, No. 1, pp. 50–62 (Reprint pp. 1125–1137).

to questions asked at a given time when measuring the intensity of a feeling which may have changed substantially over the twelve to fifteen years of married life being studied, in many cases without the respondent being aware that changes have occurred. This is one of the unavoidable handicaps of a one-time study as compared to a longitudinal study.

2. Findings

A. Fertility Planning

For the sample as a whole—including childless couples as well as couples with children—there is no clear pattern of relationship between the summary index of interest in and liking for children and fertility planning, although there is a slight tendency among both wives and husbands for a low index of liking to be accompanied by excess fertility (Table 1, deck A). However, when attention is limited to couples with children, a significant positive relationship is found between the index and the effectiveness of fertility planning. The relationship is masked when the childless couples are included, because 94 per cent of all childless wives and husbands have the combined characteristic of (a) a low index of interest in children and (b) complete success in planning the number and spacing of their pregnancies.[11] This may mean that the negative type of motivation for planning is heavily concentrated among couples who, on the basis of relatively little liking for children, decide to have *no* children. On the other hand, it may indicate only that couples who remain childless intentionally (for a variety of reasons) fail to *develop* strong interest in children.

The relationships between each of the ten individual measures of interest in children and effectiveness of fertility planning are shown in Table 2 for couples with children. Three of the interest items have a significant positive relationship to fertility planning for both wives and husbands, namely,

[11] If there was evidence that childlessness was due to other causes than the effective practice of some type of contraception, the couple was classified as "relatively sterile." As mentioned above, this analysis is restricted to "relatively fecund" couples.

2. Do you get tired of hearing the constant questions children ask?
9. How much did a strong liking for children encourage you to have your last child?
10. How much have you been discouraged from having more children by not being more interested in children?

Table 1. Effectiveness of fertility planning by summary index of interest in and liking for children, for wives and husbands.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Fertility Planning Status				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
A. All Couples						
Wives						
Very Much	406	100	27	20	33	20
Much	498	100	23	17	33	27
Some	350	100	26	9	31	34
Little	190	100	47	5	23	25
Husbands						
Very Much	254	100	32	13	34	21
Much	418	100	22	18	34	26
Some	449	100	22	17	34	28
Little	323	100	40	6	24	30
B. Couples With Children[1]						
Wives						
Very Much	406	100	27	20	33	20
Much	484	100	21	17	34	28
Some	302	100	14	11	36	39
Little	117	100	21	4	35	40
Husbands						
Very Much	254	100	32	13	34	21
Much	408	100	21	19	34	26
Some	424	100	17	18	36	29
Little	223	100	16	7	34	43
C. Childless Couples[2]						
Wives						
Some	48	100	98	2	–	–
Little	73	100	90	5	4	–
Husbands						
Some	25	100	100	–	–	–
Little	100	100	93	4	2	1

[1] The differences between the proportions of those with "very much" interest and of those with "some" or "little" interest who have excess fertility are significant at .01 level, for both wives and husbands with children. None of the tests of significance given in this report takes into account the possible effect of sample inflation.

[2] Only 14 wives and 10 husbands are rated as having "much" interest, and none as having "very much" interest. A few childless couples appear in the number planned, quasi-planned, and excess fertility groups because fertility planning status was determined on the basis of pregnancies, not live children. For example, a couple with only one pregnancy would be classed as having "excess fertility" if the pregnancy was not wanted and was ended by a miscarriage.

A positive tendency is suggested for wives and husbands in two others:

6. How does the fun you get compare with the trouble when children of your neighbors or friends come in and make themselves at home?
8. How much are you interested in hearing other people talk about their children?

No relationship—positive or negative—is indicated between

Table 2. Effectiveness of fertility planning by replies to ten questions regarding interest in and liking for children, for wives and husbands with children.

Degree of Interest in Children	Number of Couples	Per Cent Distribution by Fertility Planning Status				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
A. Wives						
1. Do you like to play with, read or talk to children?						
Very Much	556	100	21	17	33	29
Much	297	100	17	13	39	31
Some	388	100	24	15	31	30
Little	68	100	22	9	43	26
2. Do you get tired of hearing the constant questions children ask?						
Very Interested	413	100	28	18	32	22
Rather Interested	628	100	18	15	35	32
Indifferent	78	100	24	8	27	41
Tired	188	100	17	14	39	30
3. Do you get as much "kick" from the things children say as from those grownups say?						
Much More from Children	551	100	19	17	34	30
More from Children	625	100	22	15	35	28
Neither More or Less	117	100	19	10	38	33
Less from Children	16	*	*	*	*	*
4. How much do you enjoy taking children on outings?						
Very Much	794	100	23	16	33	28
Much	295	100	19	14	35	32
Some	186	100	18	13	39	30
Little	34	100	17	21	41	21

Table 2. (Continued)

Degree of Interest in Children	Number of Couples	Per Cent Distribution by Fertility Planning Status				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
5. How do you feel about seeing children's pictures in ads, store windows, etc.?						
Like Very Much	732	100	22	17	33	28
Rather Like	392	100	18	14	33	35
Slightly Interested	138	100	22	9	38	31
Not Interested or Bored	47	100	23	23	28	26
6. How does the fun you get compare with the trouble when children of your neighbors or friends come in and make themselves at home?						
Much More Fun than Trouble	264	100	25	15	40	20
Some More Fun	479	100	18	16	40	26
As Much Trouble as Fun	419	100	22	16	26	36
More Trouble than Fun	146	100	22	12	23	43
7. Frequently children get so wrapped up in their play that they forget there is anyone around. Do you find it fun just to watch them then and see what they do and say?						
Very Much	1,063	100	21	17	34	28
Much	150	100	17	11	35	37
Some	79	100	23	6	38	33
Little	17	*	*	*	*	*
8. How much are you interested in hearing other people talk about their children?						
Very Much	429	100	23	18	33	26
Much	354	100	23	15	29	33
Some	406	100	17	15	40	28
Little	120	100	20	9	37	34
9. How much did a strong liking for children encourage you to have your last child?						
Very Much	555	100	27	22	31	20
Much	286	100	25	12	35	28
Some	272	100	16	12	41	31
Little	198	100	8	7	33	52
10. How much have you been discouraged from having more children by not being more interested in children?						
Very Little	893	100	22	19	35	24
Little	273	100	20	11	34	35
Some	102	100	20	6	31	43
Much or Very Much	37	100	13	5	22	60

Table 2 (Continued).

Degree of Interest in Children	Number of Couples	Per Cent Distribution by Fertility Planning Status				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
B. Husbands						
1. Do you like to play with, read or talk to children?						
Very Much	467	100	25	17	32	26
Much	334	100	22	13	34	31
Some	441	100	15	16	39	30
Little	67	100	28	10	27	35
2. Do you get tired of hearing the constant questions children ask?						
Very Interested	356	100	29	14	30	27
Rather Interested	673	100	17	18	37	28
Indifferent	156	100	22	11	37	30
Tired	124	100	18	10	32	40
3. Do you get as much "kick" from the things children say as from those grownups say?						
Much More from Children	421	100	22	15	36	27
More from Children	676	100	21	14	33	32
Neither More or Less	169	100	16	23	37	24
Less from Children	43	100	35	5	30	30
4. How much do you enjoy taking children on outings?						
Very Much	651	100	21	16	35	28
Much	362	100	22	18	35	25
Some	228	100	17	13	34	36
Little	68	100	25	6	29	40
5. How do you feel about seeing children's pictures in ads, store windows, etc.?						
Like Very Much	371	100	22	13	35	30
Rather Like	540	100	25	15	35	25
Slightly Interested	209	100	17	24	29	30
Not Interested or Bored	189	100	15	9	38	38
6. How does the fun you get compare with the trouble when children of your neighbors or friends come in and make themselves at home?						
Much More Fun than Trouble	239	100	24	11	43	22
Some More Fun	452	100	23	19	36	22
As Much Trouble as Fun	474	100	18	15	33	34
More Trouble than Fun	143	100	23	13	19	45

Table 2 (Continued)

Degree of Interest in Children	Number of Couples	Per Cent Distribution by Fertility Planning Status				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
7. Frequently children get so wrapped up in their play that they forget there is anyone around. Do you find it fun just to watch them then and see what they do and say?						
Very Much	890	100	25	14	33	28
Much	260	100	12	20	36	32
Some	128	100	16	16	39	29
Little	31	100	26	6	42	26
8. How much are you interested in hearing other people talk about their children?						
Very Much	259	100	27	11	34	28
Much	247	100	24	18	34	24
Some	554	100	17	17	35	31
Little	249	100	22	13	34	31
9. How much did a strong liking for children encourage you to have your last child?						
Very Much	453	100	30	21	29	20
Much	312	100	25	13	36	26
Some	316	100	15	14	39	32
Little	228	100	7	11	36	46
10. How much have you been discouraged from having more children by not being more interested in children?						
Very Little	863	100	23	17	35	25
Little	236	100	22	14	29	35
Some	164	100	17	10	35	38
Much or Very Much	44	100	11	—	50	39

* Distributions are not shown for fewer than 20 persons.

the effectiveness of fertility planning and the replies to the other questions.

Since the relationship between interest in children and effectiveness of fertility planning is positive for both wives and husbands with children, it might be thought that when wives and husbands are matched as to interest an even closer relationship would be observed with planning. This does tend to be the case, as is shown in Table 3. Among couples in which

Table 3. Effectiveness of fertility planning by summary index of interest in and liking for children of wives by that of husbands, for couples with children.

Summary Index of Interest		Number of Couples	Per Cent Distribution by Fertility Planning Status[1]				
Wives	Husbands		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
Very Much	Very Much	120	100	40	17	26	17
Very Much	Much	133	100	25	22	37	16
Very Much	Some or Little	155	100	19	21	34	26
Much	Very Much	75	100	23	9	45	23
Much	Much	173	100	24	21	27	28
Much	Some or Little	235	100	17	16	37	30
Some or Little	Very Much	59	100	29	10	34	27
Some or Little	Much	102	100	12	10	42	36
Some or Little	Some or Little	251	100	15	8	34	43

[1] The difference between the couples in which both wife and husband have "very much" interest and those in which the wife has "very much" but the husband "some or little" interest with respect to the proportion classified as number and spacing planned is significant at the .01 level. The difference between the couples in which both wife and husband have "very much" interest and those in which the wife has "some or little" and the husband "very much" interest with respect to the proportion who planned the number and spacing of their pregnancies does not reach the .10 level of significance. However, the difference is significant at the .10 level between the couples in which both wife and husband have "some or little" interest and those in which the wife has "some or little" but the husband "very much" interest.

both wife and husband have a high index of interest in children, 40 per cent planned the number and spacing of their pregnancies, compared to 27 per cent of all couples in which the wife has a high index (regardless of the husband), and 32 per cent of all couples in which the husband has a high index. Similarly, when both wife and husband have a low index of liking, 43 per cent are excess fertility, which is somewhat above the corresponding figure of 39 per cent for couples in which the wife has a low index and 34 per cent for those in which the husband has a low index regardless of the spouse's rating. If the reasoning implicit in the hypothesis is correct, this finding suggests that planning behavior is more likely to be consistent with level of liking for children when both husband and wife are similar in their degree of interest in children (and presumably also in the strength of their motivation to plan their family) than when they are different. If both members of the couple strongly like children they are highly motivated to plan effectively; if both are not interested in children they are unlikely to plan effectively because they lack this positive motivation.

In addition to indicating that similarity of wives' and husbands' attitudes toward children reinforces the tendency to plan, Table 3 also shows that the wife's and husband's summary indexes of liking for children are somewhat independent of one another. Furthermore, the table shows that when the wife's index of interest is high but the husband's low, the proportion of couples that plan effectively (19 per cent) is smaller than when the husband's index is high and the wife's low (29 per cent). Again, following through the reasoning underlying the hypothesis, this suggests that husbands with strong liking for children more often exert an independent influence in the direction of effective fertility planning than wives with such a liking. No such difference is found in the proportion of couples having excess fertility.

In addition to the difference mentioned above between the childless couples and those with children, it appears that the

relationship between interest in children and fertility planning is not the same for couples that differ in family size. (*See*

Table 4. Effectiveness of fertility planning by summary index of interest in and liking for children, for wives and husbands with different numbers of children.

Summary Index of Interest, and Number of Children	Number of Couples	Per Cent Distribution by Fertility Planning Status[1]				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
A. Wives						
One Child						
Very Much	135	100	48	4	39	9
Much	120	100	38	5	43	14
Some or Little	110	100	35	4	38	23
Two Children						
Very Much	153	100	26	33	27	14
Much	213	100	22	26	36	16
Some or Little	174	100	14	12	48	26
Three Children						
Very Much	63	100	5	24	35	36
Much	97	100	7	16	24	53
Some or Little	74	100	3	14	24	59
Four or More						
Very Much	55	100	4	18	31	47
Much	54	100	2	9	30	59
Some or Little	61	100	3	5	10	82
B. Husbands						
One Child						
Very Much	70	100	47	–	50	3
Much	115	100	45	6	37	12
Some or Little	180	100	36	5	38	21
Two Children						
Very Much	145	100	29	38	21	12
Much	176	100	17	30	37	16
Some or Little	219	100	19	7	48	26
Three Children						
Very Much	46	100	4	30	26	40
Much	70	100	8	13	28	51
Some or Little	118	100	3	15	27	55
Four or More						
Very Much	28	100	4	7	29	60
Much	47	100	2	15	21	62
Some or Little	95	100	3	9	23	65

[1] For wives with one, two, or three children, the difference between those with "very much" interest and those with "some or little" interest with respect to the proportion classified as excess fertility is significant at the .10 level. For women with four or more children this difference is significant at the .01 level.

The difference between the one-child husbands with "very much" interest and the one-child husbands with "some or little" interest with respect to the proportion classified as excess fertility is significant at the .05 level; the difference for husbands with two or three children is significant at the .10 level; for husbands with four or more children the difference does not reach the .10 level of significance.

Table 4.) For both wives and husbands *with one or two children* there is a clear positive relationship between the index of interest and the effectiveness of fertility planning. For those with three children, the positive pattern is less evident, in part, no doubt, because so few are number and spacing planned. Among wives with four or more children there is a sharp rise in the proportion with excess fertility as the index of interest declines. Among husbands with four or more children, how-

Table 5. Effectiveness of fertility planning by summary index of interest in and liking for children, by socio-economic status, for wives and husbands with children.

Summary Index of Interest, and Socio-Economic Status	Number of Couples	Per Cent Distribution by Fertility Planning Status[1]				
		Total	Number and Spacing Planned	Number Planned	Quasi-Planned	Excess Fertility
A. Wives						
Upper Status						
Very Much	155	100	50	19	23	8
Much	126	100	29	22	28	21
Some or Little	121	100	28	16	44	12
Middle Status						
Very Much	85	100	14	20	46	20
Much	119	100	24	12	40	24
Some or Little	88	100	13	10	43	34
Lower Status						
Very Much	166	100	13	20	35	32
Much	239	100	15	17	35	33
Some or Little	210	100	10	5	28	57
B. Husbands						
Upper Status						
Very Much	68	100	55	15	24	6
Much	120	100	38	18	30	14
Some or Little	214	100	30	21	34	15
Middle Status						
Very Much	63	100	30	10	48	12
Much	98	100	16	16	41	27
Some or Little	131	100	13	14	42	31
Lower Status						
Very Much	123	100	20	14	32	34
Much	190	100	14	20	32	34
Some or Little	302	100	9	10	33	48

[1] For upper status wives and husbands the difference between those with "very much" interest and those with "some or little" interest with respect to the proportion classified as number and spacing planned is significant at the .01 level. For middle status husbands and lower status wives and husbands the difference between those with "very much" interest and those with "some or little" interest with respect to the proportion classified as excess fertility is significant at the .01 level; for middle status wives the difference is significant at the .05 level.

ever, there is no consistent relationship between the index of interest and the proportion in any fertility planning group.

The positive relationship between interest in children and effectiveness of fertility planning among couples with children persists in all socio-economic status groups. This holds true for both wives and husbands, as is shown by the summary index of interest in Table 5. The relationship appears somewhat closer on the whole among wives and husbands of high socio-economic status than those of medium or low status.[12]

B. FERTILITY, AND SIZE OF PLANNED FAMILY

Considering all couples, regardless of fertility planning status, those with a high index of interest in children are more likely

[12] There is only a slight association between socio-economic status and the index of interest in children. The distribution of wives by socio-economic status is the same for those with "very much" and "little" interest. For husbands, the proportion having high socio-economic status tends to vary inversely with degree of interest in children.

Socio-economic status by summary index of interest in and liking for children, for all couples.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Socio-Economic Status					
		Total	1 (High)	2	3	4	5 (Low)
Wives							
Very Much	405	100	21	17	21	25	16
Much	500	100	12	14	25	31	18
Some	350	100	10	19	22	29	20
Little	189	100	20	18	21	25	16
Husbands							
Very Much	260	100	10	17	25	29	19
Much	413	100	16	14	24	28	18
Some	450	100	13	21	21	27	18
Little	321	100	23	14	20	28	15

For the analysis of fertility and fertility planning by socio-economic status *see* Kiser and Whelpton: Social and Psychological Factors Affecting Fertility. IX. Fertility Planning and Fertility Rates by Socio-Economic Status. The Milbank Memorial Fund *Quarterly*, April, 1949, XXVII, No. 2, pp. 188–244 (Reprint pp. 359–415).

Appendix II in Part IX shows the basis for classifying couples according to socio-economic status. Nine groups were formed. In the above table five groups are used, which correspond to the following original groups: 0–1, 2, 3, 4, and 5–9. In other tables where it is necessary to combine still further, three groups are used, which correspond to the original status groups 0–2, 3, and 4–9.

Summary Index of Interest	Births Per 100 Couples[1]				Number of Couples			
	All Couples		Couples with Children		All Couples		Couples with Children	
	Wives	Husbands	Wives	Husbands	Wives	Husbands	Wives	Husbands
Very Much	218	222	218	222	406	254	406	254
Much	219	212	225	218	498	418	484	408
Some	201	215	233	228	350	449	302	424
Little	134	158	218	229	190	323	117	223

[1] The difference between the fertility rates for wives and husbands classified as having "very much" interest and those having "little interest" is significant at the .01 level for all couples.

Table 6. Fertility rates by summary index of interest in and liking for children, for all wives and husbands and those with children.

to have *some* rather than *no* children than those with a low index, but among couples with children there is no tendency for persons who like them very much to have *larger* families than those who like them moderately or less. As shown in Table 6, fertility rates tend to vary directly with the index of interest

Table 7. Number of live births by summary index of interest in and liking for children, for all wives and husbands.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Number of Live Births[1]					
		Total	None	1	2	3	4 or More
A. Wives							
Very Much	406	100	—	33	38	15	14
Much	498	100	3	24	43	19	11
Some	350	100	14	22	35	16	13
Little	190	100	38	17	27	10	8
B. Husbands							
Very Much	254	100	—	28	41	19	12
Much	418	100	2	28	42	17	11
Some	449	100	6	24	41	16	13
Little	323	100	31	22	23	14	10

[1] The difference in per cent childless is significant (at the .01 level) between the couples with "very much" interest and those with "little" interest. The difference in the proportion having one child is also significant (at the .01 level) between wives with "very much" interest and those with "little" interest; this is not true for husbands.

in children when all couples are included, but not to vary significantly when the couples with children are considered separately. It is notable in Table 7 that not one wife or husband who is rated as very much interested in children is childless. Similarly, Table 8 indicates that over half of the childless wives and nearly three-fourths of the childless husbands are classified as having "little" interest, but that among the groups with children the maximum for "little" interest is 9 per cent for women and 28 per cent for men. Unfortunately, the data do not show whether couples that are not interested in children decide to avoid having any, or whether those that are intentionally childless[13] fail to develop much interest in them. It seems probable, however, that the cause-effect sequence is in one direction for some couples and in the opposite direction for others.

Table 8. Summary index of interest in and liking for children by number of live births, for all wives and husbands.

Number of Live Births	Number of Couples	Per Cent Distribution by Interest in Children[1]				
		Total	Very Much	Much	Some	Little
Wives						
None	135	100	—	10	36	54
One	365	100	37	32	22	9
Two	540	100	28	40	23	9
Three	234	100	27	41	24	8
Four or More	170	100	32	32	27	9
Husbands						
None	135	100	—	7	19	74
One	365	100	19	32	30	19
Two	540	100	20	33	34	13
Three	234	100	21	30	30	19
Four or More	170	100	17	28	35	20

[1] The difference between the childless couples and those with any other family size with respect to the proportion with a rating of "very much" interest is significant at the .01 level. The difference between the childless couples and those with any other family size with respect to the proportion rated "little" interest is also significant at the .01 level.

[13] As mentioned earlier, couples who were unable to have at least one child were classified as "relatively sterile" and are not included in this analysis.

Table 9. Fertility rate by degree of interest in and liking for children (summary index and ten items), for all couples who planned the number and spacing of their pregnancies and those with children.

Summary Index and Specific Items	All Couples				Couples with Children			
	Births per 100 Couples		Number of Couples		Births per 100 Couples		Number of Couples	
	Wives	Husbands	Wives	Husbands	Wives	Husbands	Wives	Husbands
Summary Index								
Very Much	147	172	110	82	147	172	110	82
Much	146	139	113	95	165	152	100	87
Some	71	103	90	97	149	139	43	72
Little	41	43	90	129	154	156	24	36
1. Do you like to play with, read or talk to children?								
Very Much					150	165	116	115
Much					163	155	51	75
Some or Little					152	142	108	85
2. Do you get tired of hearing the constant questions children ask?								
Very Interested					153	173	114	100
Rather Interested					154	146	110	118
Indifferent or Tired					163	144	51	57
3. Do you get as much "kick" from the things children say as from those grownups say?								
Much More from Children					156	160	106	89
More from Children					158	154	140	144
The Same or Less					141	152	29	42
4. How much do you enjoy taking children on outings?								
Very Much					150	163	179	138
Much					173	145	56	80
Some or Little					153	151	40	57
5. How do you feel about seeing children's pictures in ads, store windows, etc.?								
Like Very Much					159	175	164	80
Rather Like					145	145	69	132
Not Interested					157	151	42	63
6. How does the fun you get compare with the trouble when children of your neighbors or friends come in and make themselves at home?								
Much More Fun than Trouble					138	141	66	58
Some More Fun					163	175	84	100
As Much or More Trouble than Fun					159	145	125	117
7. Frequently children get so wrapped up in their play that they forget there is anyone around. Do you find it fun just to watch them then and see what they do and say?								
Very Much					159	158	227	216
Much					138	152	26	31
Some or Little					132	136	22	28
8. How much are you interested in hearing other people talk about their children?								
Very Much					151	171	100	68
Much					161	148	80	60
Some or Little					155	151	95	147
9. How much did a strong liking for children encourage you to have your last child?								
Very Much					159	159	146	133
Much					148	160	71	79
Some or Little					155	141	58	63
10. How much have you been discouraged from having more children by not being more interested in children?								
Very Little					156	158	193	190
Little					150	149	54	51
Some or Much					162	144	26	32

Next, considering only couples who planned the number and spacing of their pregnancies, but combining the childless couples and those with children, the same positive relationship is found between interest in children and fertility. (*See* Table 9.). Again, *among wives* this is due mainly to the tendency for those with a high summary index to have some children rather than none; there is little, if any, tendency for the more interested women to have larger families than the less interested. The summary index and the ten "interest" items give no evidence of being significantly related to fertility among women with children that were planned as to number and spacing.

On the other hand, among *husbands* with children planned as to number and spacing, a positive relationship between fertility and interest in children is shown by the summary index and at least three of the index items. This is reflected in the fertility rates given in Table 9. In addition, Table 10 indicates that, among couples classified as number and spacing planned, the proportion of husbands with two, three, or four or more children is greater among the much interested than the little interested. It is important to note, however, that the positive relationship for husbands with children in Table 9 is accounted for in large part by the greater tendency for those with consid-

Table 10. Number of live births for wives and husbands by summary index of interest in and liking for children, for couples with children who planned the number and spacing of their pregnancies.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Number of Live Births[1]				
		Total	1	2	3	4 or More
Wives						
Very Much	110	100	59	36	3	2
Much	100	100	45	47	7	1
Some or Little	67	100	57	37	3	3
Husbands						
Very Much	82	100	40	51	5	4
Much	87	100	59	33	7	1
Some or Little	108	100	59	38	2	1

[1] The difference between the proportion of husbands with one child who have "very much" interest and "some or little" interest is significant at the .01 level.

erable interest in children to have two children rather than one, and in very minor degree by a tendency to have three or more.

In this connection attention should be called to the report by Westoff and Borgatta, based on factor analysis of Indianapolis data, that "liking for children" is the main factor relevant to planned fertility among the twenty social and psychological factors tested. Their inclusion of childless couples probably accounts in large measure for their finding higher fertility rates among those with strong liking for children than among those with little interest.[14]

It is possible that interest in children has little influence on the decision to have the first child, and that the low level of interest in children on the part of childless couples is due to their lack of opportunity to develop an interest in children. After the first child, a re-evaluation may take place—with those couples who find they are not very interested in children taking measures to avoid having a second child, and those who find themselves strongly interested going on to have a second child.

There is interesting variation in the pattern of relationship by socio-economic status. Among all the effective planners (with and without children) there is a strong positive relationship in the upper and lower status groups between wives' and husbands' index of interest in children and the fertility rate. (*See* Table 11.) Among those with children, however, there is a weaker positive relationship for husbands and little evidence of one for wives. In fact among the lower status wives the relationship appears to be negative. These findings should be considered with caution, however, because of the small number of cases involved.

Table 12 indicates the relationship between fertility and the wife's interest in children classified by the husband's interest, for number and spacing planned couples with children. The

[14] Westoff and Borgatta: Social and Psychological Factors Affecting Fertility. XXVI. The Prediction of Planned Fertility. *Op. cit.*

Table 11. Fertility rate by summary index of interest in and liking for children, by socio-economic status, for all couples who planned the number and spacing of their pregnancies and those with children.

Summary Index of Interest, and Socio-Economic Status	Births Per 100 Couples				Number of Couples			
	All Couples		Couples with Children		All Couples		Couples with Children	
	Wives	Husbands	Wives	Husbands	Wives	Husbands	Wives	Husbands
Upper Status								
Very Much	149	182	149	182	77	38	77	38
Much	154	149	189	162	44	49	36	45
Some or Little	65	81	159	148	83	117	34	64
Middle Status								
Very Much	*	*	*	*	12	19	12	19
Much	144	*	159	*	32	19	29	16
Some or Little	29	52	*	*	38	44	11	17
Lower Status								
Very Much	138	164	138	164	21	25	21	25
Much	138	130	146	135	37	27	35	26
Some or Little	58	57	154	141	59	65	22	27

* Fewer than 20 persons.

Summary Index of Interest		Number of Couples	Fertility Rate
Wives	Husbands		
Very Much	Very Much	48	158
Very Much	Much, Some or Little	62	139
Much, Some or Little	Very Much	34	191
Much, Some or Little	Much, Some or Little	133	152

Table 12. Fertility rate by summary index of interest in and liking for children of wives by that of husbands, for number and spacing planned couples with children.

positive relationship for husbands persists regardless of the wife's classification. For wives, on the other hand, there appears to be a negative relationship between degree of interest and fertility regardless of whether the husband has a high or low rating for interest. The highest fertility is not found in those couples where the husband and wife are both strongly interested in children, but among those where the husband's index is "very much" "much," and the wife's index is "some" or "little." This suggests that when the husband has a strong liking for children, a similar feeling by the wife tends to *hold down* family size. It may be, then, that the wife's interest in children tends to be satisfied about as well by one planned child as by a larger number. While a husband's strong liking for children is expressed in fertility planning, as is his wife's, the husband's inclination seems to be to press for a larger family as well. It must be remembered, however, that most of the "larger families" among these number and spacing planned couples include only two children.

The *ex post facto* nature of this study does not permit conclusions about whether strong interest is a cause of higher fertility (as stated in the hypothesis), or whether persons who have larger families develop a stronger interest as a result of the experience of having larger families. Two other questions asked of the respondents have a bearing on this point, one relating to the number of children wanted at marriage and the other to the number the person would have on the basis of liking

if married life could be begun again. There is a positive relationship between the index of interest and the number of children wanted at marriage and also the number wanted if married life could be relived. (*See* Tables 13 and 14.) This is true for all wives and husbands and also for those with children. The number of children wanted at marriage is substantially

Table 13. Number of children wanted when married, and actual fertility rate, by summary index of interest in and liking for children, for all couples and couples with children.

Summary Index of Interest	Number of Couples[1]	Per Cent Distribution by Number Wanted[2]						Fertility Rate	
		Total	None	1	2	3	4 or More	Wanted at Marriage	Actual
	ALL COUPLES								
Wives									
Very Much	404	100	3	5	48	19	25	264	218
Much	492	100	4	8	55	15	18	237	219
Some	333	100	8	7	61	9	15	221	201
Little	190	100	17	4	55	14	10	200	134
Husbands									
Very Much	243	100	6	5	52	19	18	242	222
Much	406	100	5	8	55	16	16	235	212
Some	437	100	5	8	59	18	10	225	215
Little	312	100	21	12	50	13	4	167	158
	COUPLES WITH CHILDREN								
Wives									
Very Much	404	100	3	5	48	19	25	264	218
Much	478	100	3	8	55	15	19	240	225
Some	289	100	6	7	61	9	17	229	233
Little	117	100	13	6	51	17	13	217	218
Husbands									
Very Much	243	100	6	5	53	19	17	242	222
Much	396	100	5	8	54	16	17	235	218
Some	412	100	4	8	59	18	11	227	228
Little	216	100	16	12	54	14	4	177	229

[1] The totals shown differ from those of earlier tables because several respondents failed to answer one or both of the questions about desired family size.

[2] The difference between the husbands and wives classified as having "very much" interest and those classified as having "little" interest with respect to the proportion wanting four or more children at marriage is significant at the .01 level. The difference with respect to the proportion wanting no children at marriage is also significant at .01 for all couples and at .05 for couples with children.

smaller than the number wanted if married life could be relived for wives and husbands at all levels of interest. Among all couples the number wanted at either period is consistently larger than the number actually born, regardless of level of interest. Among couples with children this is true except with respect to the number wanted at marriage by wives and hus-

Table 14. Number of children would like if could relive married life, and actual fertility rate, by summary index of interest in and liking for children, for all couples and couples with children.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Number Would Like[1]						Fertility Rate	
		Total	None	1	2	3	4 or More	Would Like	Actual
	ALL COUPLES								
Wives									
Very Much	406	100	–	1	23	25	51	367	218
Much	497	100	–	1	39	23	37	311	219
Some	350	100	–	2	51	23	24	285	201
Little	190	100	4	5	56	18	17	241	134
Husbands									
Very Much	252	100	–	2	36	23	39	343	222
Much	418	100	–	1	36	27	36	337	212
Some	449	100	–	4	45	19	32	303	215
Little	321	100	5	7	54	22	12	234	158
	COUPLES WITH CHILDREN								
Wives									
Very Much	406	100	–	1	23	25	51	367	218
Much	483	100	–	1	39	23	37	310	225
Some	302	100	–	3	52	20	25	282	233
Little	117	100	–	3	59	18	20	257	218
Husbands									
Very Much	252	100	–	2	36	23	39	343	222
Much	408	100	–	1	35	27	37	339	218
Some	424	100	–	3	45	20	32	306	228
Little	223	100	2	9	47	27	15	247	229

[1] The difference between the husbands and wives classified as having "very much" interest and those classified as having "little" interest with respect to the proportion wanting four or more children if married life could be relived is significant at the .01 level. The difference with respect to the proportion wanting two children if married life could be relived is also significant at the .01 level for all wives and husbands and for wives with children, and at the .05 level for husbands with children.

bands with "some" or "little" interest. The tendency to want four or more children if married life could be repeated is strikingly greater for couples with "very much" interest than for those with "little" interest. While this difference is also found for the number wanted at marriage, it is not as sharp as for the number wanted if married life could be started again.

Table 15. Opinions about desired family size by summary index of interest in and liking for children, for all number and spacing planned couples.

Summary Index of Interest	Number of Couples	Per Cent Distribution by Number of Children						Fertility Rate	
		Total	None	1	2	3	4 or More	Wanted	Actual
	WANTED AT MARRIAGE[1]								
Wives									
Very Much	110	100	5	11	43	19	22	244	147
Much	113	100	8	15	54	17	6	198	146
Some	82	100	16	4	62	9	9	197	71
Little	90	100	26	1	58	9	6	176	42
Husbands									
Very Much	74	100	8	8	45	25	15	235	172
Much	93	100	2	4	65	18	11	232	139
Some	95	100	4	13	57	23	3	209	103
Little	122	100	27	12	43	15	3	155	43
	WOULD LIKE IF MARRIED LIFE COULD BE RELIVED[2]								
Wives									
Very Much	110	100	–	2	25	30	43	336	147
Much	113	100	–	2	50	27	21	276	146
Some	89	100	–	–	48	37	15	289	71
Little	90	100	9	8	59	15	9	209	42
Husbands									
Very Much	82	100	–	5	36	21	38	343	172
Much	95	100	–	–	35	39	26	315	139
Some	97	100	–	10	47	21	22	260	103
Little	126	100	8	5	63	15	9	217	43

[1] The difference between the husbands and wives classified as having "very much" interest and those classified as having "little" interest with respect to the proportion wanting no children at marriage is significant at the .01 level. The difference with respect to the proportion wanting four or more children at marriage is significant at the .05 level.

[2] The difference between the very interested and the little interested with respect to the proportion wanting two children if married life could be relived is significant at the .01 level. The same statement can be made with respect to the proportion wanting four or more children.

A significant positive relationship between the summary index of interest in children and both the number wanted at marriage and if married life could be relived is found also among the couples who planned the number and spacing of their pregnancies. (*See* Table 15.) The larger number of children wanted at marriage by wives with a high index than by those with a low index is due almost entirely to the greater tendency of the former to have wanted some children rather than none. When wives who wanted no children at marriage are excluded the difference in rates between those with a high index and those with a low index disappears.[15] Among husbands with children, on the other hand, those having a strong liking wanted a larger number when married than those with a weak liking. An important part of this difference, however, reflects a desire for two children rather than one. While it is possible that answers to this question may have been rationalized to agree with actual family experience, these findings are consistent with the hypothesis that strong interest in children, at least among husbands, may serve as motivation for having larger than average families. Particularly suggestive is the fact that husbands who are rated as "very much" interested in children said they wanted larger families when they were first married, and came nearer to achieving their goal, than is the case for husbands with "little" interest. Wives with a strong interest said they wanted more children when married than husbands with this rating, but actual size of family was considerably smaller.

[15] Fertility rates based on the number of children wanted by wives and husbands, excluding those wanting no children, for all number and spacing planned couples.

Summary Index of Interest	Number of		Number of Children Wanted at Marriage		Number of		Number of Children Would Like if Married Life Could Be Relived	
	Wives	Husbands	Wives	Husbands	Wives	Husbands	Wives	Husbands
Very Much	105	68	244	256	110	82	336	343
Much	104	91	216	237	113	95	276	315
Some	69	91	235	218	89	97	289	260
Little	66	89	239	212	82	116	228	235

For both wives and husbands the summary index of interest in children is closely related to the size of family she or he would have on the basis of liking if married life could be lived again. (*See* lower deck of Table 15.) There is a strikingly greater tendency for couples with a strong liking for children than for those with a weak liking to want four or more children if they could make a fresh start. This finding fits in with the previous suggestions concerning the relationship of husbands' attitudes to children and family size. And it suggests that for wives also there is some connection between degree of interest in children and family size desires. It may be that other forces overshadow women's attitudes about children in determining family size. Or it may be that women with strong interest in children *develop* a desire to have a large family only after they have had children. The plausibility of this latter notion is suggested by the finding that among women who wanted some children at marriage, those with a high index wanted no more than those with a low index.

In seeking to understand the relationship between fertility and attitudes toward children, it is helpful to compare actual fertility and attitudes about family size at the time of marriage and after childbearing. Table 16 shows that, for wives and husbands who successfully planned their families, the fertility rate based on live births rises markedly with the number of children reported as wanted when married and also with the number desired if married life could be lived again. There is a strong tendency for those saying they wanted no children or one child when married to actually have this same number. Among the wives who said they wanted no children, 61 per cent succeeded in remaining childless; those who wanted one child actually performed according to their desire in 70 per cent of the cases. Those wanting two children at marriage produced larger families, on the average, than all those wanting fewer children, but the likelihood that they would have exactly two children was not high (28 per cent), and the average number born was less than two. Similarly, the wives wanting three or four or more

children did not follow the tendency of those wanting no child or one to produce the number wanted; instead, they bore fewer, on the average, than they had wanted. Nevertheless, for both wives and husbands there is a consistent relationship between

Table 16. Actual fertility by desired family size, for all number and spacing planned couples.

Number of Children	Number of Couples	Per Cent Distribution by Actual Number of Live Births[1]						Actual Fertility Rate
		Total	None	1	2	3	4 or More	
Wanted at Marriage								
Wives								
0	51	100	61	31	8	–	–	47
1	33	100	15	70	15	–	–	100
2	213	100	34	36	28	2	–	98
3	55	100	15	36	36	8	5	154
4 or More	43	100	14	19	53	9	5	184
Husbands								
0	45	100	67	20	11	2	–	49
1	36	100	39	47	14	–	–	75
2	199	100	29	44	25	1	1	100
3	76	100	18	32	41	8	1	143
4 or More	28	100	18	7	53	11	11	199
Would Like if Could Relive Married Life[2]								
Wives								
0	8	100	*	*	*	*	*	*
1	11	100	*	*	*	*	*	*
2	181	100	33	45	22	–	–	90
3	110	100	28	33	36	3	–	116
4 or More	92	100	22	29	38	7	4	216
Husbands								
0	10	100	*	*	*	*	*	*
1	20	100	30	70	–	–	–	70
2	189	100	41	36	22	1	–	83
3	93	100	14	47	30	9	–	133
4 or More	88	100	19	24	48	3	6	153

* Fewer than 20 wives.

[1] The proportion actually childless is significantly larger (at the .01 level) for wives and husbands who wanted no children at marriage than for those who wanted one or more children.
The proportion that actually has two children is significantly smaller (at the .01 level) for wives who would like two children if married life could be relived than for those who would like four or more children; the difference for husbands is significant at the .01 level.

[2] The eight wives and ten husbands with no children said they would like to be childless.

the number of children wanted at marriage and the number of children actually produced.

Arranging the percentages and rates in the opposite direction shows clearly that the smaller the actual family the smaller

Table 17. Desired family size by actual fertility, for all number and spacing planned couples.

Actual Number of Live Births	Number of Couples	Per Cent Distribution by Number of Children						"Wanted" Fertility Rate
		Total	None	1	2	3	4 or More	
	NUMBER WANTED AT MARRIAGE[1]							
Wives								
0	123	100	25	4	59	6	6	165
1	143	100	11	16	53	14	6	188
2	112	100	4	4	53	18	21	251
3	12	*	*	*	*	*	*	347*
4 or More	5	*	*	*	*	*	*	
Husbands								
0	121	100	24	12	48	12	4	159
1	140	100	7	12	63	17	1	195
2	106	100	5	5	47	29	14	244
3	12	*	*	*	*	*	*	318*
4 or More	5	*	*	*	*	*	*	
	NUMBER WOULD LIKE IF MARRIED LIFE COULD BE RELIVED[2]							
Wives								
0	125	100	6	4	49	25	16	254
1	148	100	–	3	55	24	18	259
2	112	100	–	2	32	35	31	318
3	12	*	*	*	*	*	*	400*
4 or More	5	*	*	*	*	*	*	
Husbands								
0	123	100	8	5	63	10	14	219
1	148	100	–	9	47	30	14	271
2	112	100	–	–	38	25	37	334
3	12	*	*	*	*	*	*	353*
4 or More	5	*	*	*	*	*	*	

* Fewer than 20 couples.

[1] The proportion of childless wives who wanted no children at marriage is significantly different (at the .05 level) from the proportion of one-child wives who wanted no children, and it is significantly different at the .01 level from the proportion of two-child wives who wanted no children. The comparable differences for husbands are both significant at the .01 level.

[2] The difference between the childless wives and husbands and those with two children with respect to the proportion that would like four or more children if they could relive married life is significant at the .01 level.

the number of children reported as wanted at marriage. (*See* Table 17.) It shows also that there is a strong tendency for all couples, regardless of the number of live births they had, to say that they wanted two children. Among those who had fewer than two children the average number wanted is a little less than two, while among those who had two or more children it is a little over two. Among childless women, only one-fourth stated that they wanted no children at the time of marriage and only 4 per cent that they wanted a single child; 59 per cent said they wanted two children. This suggests that there may be a generally preferred family size—two children in the case of this sample—and that this value may exert pressure on couples to have two children regardless of their inclination to have another number on the basis of their interest in children. The norm may encourage couples to have a second child who, on the basis of their low level of liking for children, would be inclined to have only one child. Similarly, the norm may operate to restrict the family size of couples who, on the basis of strong liking for children, would be inclined to have three or four children.

There is also a positive relationship between the actual fertility of a couple and the number of children they say they would have on the basis of liking if they could live their married life again. Each of the eight wives and ten husbands who would like to be childless if they could start anew was childless. In contrast, only 6 per cent of the wives and 8 per cent of the husbands who actually were childless would like to be childless if they could relive their lives. This reflects the general tendency for couples to want a larger family than they actually had if they could have another opportunity. The concentration of reports on two children, regardless of the actual size of family, is not as great as is the case for size of family wanted at time of marriage. This suggests that other forces come into play during marriage to mold values about the desirable family size. One of the important ones may be the present level of interest in children, which has already been shown to be related

to the family size that would be chosen on the basis of liking if married life could be repeated.

C. SUMMARY

One of the original Indianapolis Study hypotheses is: The stronger the interest in and liking for children the lower the proportion of couples practicing contraception effectively and the larger the planned family. In the light of present knowledge about social and psychological factors related to fertility it appears more plausible to reverse the first part of the hypothesis. The Indianapolis Study findings on the relationship between fertility control and marital adjustment, feelings of personal adequacy, ego-centered interest in children, and attitudes toward the restriction of personal freedom point to the importance of positive rather than negative motives for family planning. Unfortunately, the available data do not permit an adequate test of this part of the hypothesis in reversed form. The measures used to represent interest in and liking for children were not designed to represent one or two precise attitude dimensions. Furthermore, it is hazardous to impute a causal connection between attitudes toward children as reported 12 to 15 years after marriage and fertility decisions made throughout that period.

The first part of this hypothesis is sustained in the analysis in so far as a comparison between childless couples and couples with children is concerned. Among the couples that were childless from choice (practicing contraception always or usually) 9 out of 10 had little interest in children. Among couples with children there is a positive relationship between indices of degree of interest in children and effectiveness of fertility planning. The relationship characterizes all socio-economic groups. It is in accord with the idea that a large element in the motivation for fertility planning by couples having children may be a desire to seek the best interests of children and family.

The second part of the hypothesis is sustained among husbands, at least. Family size is positively related to indices of degree of interest in children among all couples and effective

planners; but the principal source of the variation is the greater tendency to have *some* rather than *no* children among couples with strong liking for children than among those with little liking for them. Among husbands in all socio-economic status groups there is a tendency for more interest in children to be accompanied by *larger* families. This tendency is not found among wives.

The highest fertility among the number and spacing planned couples is found when the husband is strongly interested in children and the wife only moderately or little interested, suggesting that, if the husband has a strong liking for children, a strong liking by the wife tends to hold down family size. The wife's liking for children does not appear to be expressed in terms of large family size.

Among couples classified as number and spacing planned, the direct relationship between degree of interest in children and number of children wanted at marriage is closer for husbands than for wives. But there is a direct relationship for both wives and husbands between liking for children and the number of children they would have on the basis of liking if they could live married life over again. This holds true for all couples, couples with children, and couples classified as number and spacing planned. It suggests that there is a tendency for strong interest in children to produce a desire for a large family among women as well as men, but that this does not occur in women until after they have had their families. Other pressures apparently have more effect with women.

One influence which may be competing with interest in children is the general inclination for couples to think that a two-child family is the best size regardless of their level of liking for children. However, in addition to the tendency for all groups to want two children at marriage, there is clear indication that the size of family wanted at marriage, and the size that would be chosen on the basis of liking if married life could be relived, are both related to the number of children the couple actually has.

ANNOTATIONS

THE CODIFICATION OF SOCIAL SCIENCE METHODOLOGY[1]

THIS most recent addition to the rapidly increasing number of Readers in the methodology of social research is a collection of over sixty articles all but a few of which have been previously published. Most of the selections actually are brief reports of empirical studies that provide the illustrative materials for the editors' theoretical organization of the volume: "Concrete studies are being scrutinized as to the procedures they use, the underlying assumptions they make, the modes of explanation they consider as satisfactory. Methodological analysis in this sense provides the elements from which a future philosophy of the social sciences may be built." This frame of reference is introduced and the articles connected by a series of introductions to the six sections comprising the book: Concepts and Indices; Multivariate Analysis; The Analysis of Change Through Time; Formal Aspects of Research on Human Groups; The Empirical Analysis of Action; and, Toward a Philosophy of the Social Sciences.

The editors are to be congratulated for their consistently excellent choices of research materials. Many of the most well-known and important studies in the social sciences have been represented, e.g., the American Soldier studies, the Burgess and Cottrell marriage prediction work, the Lazarsfeld *et al* election studies, the Klineberg race intelligence research, Katona's test of the Keynesian hypothesis on income and savings rate changes, Dorothy Thomas' research on Swedish population

[1] Lazarsfeld, Paul F. and Rosenberg, Morris (Eds.): THE LANGUAGE OF SOCIAL RESEARCH, A READER IN THE METHODOLOGY OF SOCIAL RESEARCH. Glencoe, Illinois, The Free Press, 1955, 590 pp., $6.75.

change and economic factors, Bales' work on the categorization of the interaction process in small groups, Cattell's research on group characteristics, and many others too numerous to cite. At the more explicitly theoretical level are such pieces as Merton's paradigm for the study of the sociology of knowledge, an exceptionally clear description by Hans Zetterberg of the usefulness of axiomatic theories in sociology, and others. The vulnerable aspect of this book is decidedly not in its selection of materials.

A basic question remains, however, of the significance of the general contribution made by the editors which stands or falls mainly on the merits of the connective tissue they supply to organize and give meaning to the sections and reprints. Their main theoretical objective is to examine the extent to which methodology in the social sciences can be codified and formalized. In retrospect, this seems to have been a noble but largely unsuccessful attempt, a criticism that derives more from the prematurity of the attempt, or perhaps more accurately, from the "state of the arts" than from any inadequacy of the editors. What their editorial work spotlights is the fact that there are certain common, recurring methodological and epistemological problems in social science ranging from such questions as to how to handle more than two variables simultaneously to what are the most fruitful levels of asking "why?". The recognition of the recurrent nature of such problems, and selections illustrating specific attempts at solving them, is no doubt desirable. However, despite the fact that the editors disclaim any intention of competing with "the substantive, creative worker" for the laurels of science, their emphasis does not demonstrate it. At times, fairly simple and elementary concepts and analytical models are put through such a rigorous intellectual wringer that the result serves to confuse more than to enlighten. That awareness of assumptions, limitations, and implications of research method, for example, is indispensable intellectual equipment is undeniable; that the extent to which it occasionally is pushed in this work will enhance the ultimate quality of the research product is far less certain.

The book probably will (and should) find wide acceptance in the graduate schools of social science. Its best use is prob-

ably as a type of source book for illustrating kinds of research problems and their attempted solutions by many of our outstanding social scientists.

CHARLES F. WESTOFF

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COMPARATIVE POPULATION AND URBAN RESEARCH VIA MULTIPLE REGRESSION AND COVARIANCE ANALYSIS[1]

As the title of this monograph may suggest, the two-fold purpose of this study is methodological and substantive, i.e., it discusses (1) the use of the multiple regression and covariance analysis as an approach to population and urban research and (2) the investigation of several hypotheses concerning urban and suburban growth.

Chapter 1 is devoted entirely to an explanation and rationale of the methodology. The "comparative" approach to urban research, as used here, is one which utilizes standard metropolitan areas as units of equal weight. This is contrasted with the more traditional "aggregative" approach in which totals for groups of areas are used. While "aggregative" methods are useful for description, they have only limited value for arriving at multiple-variable explanations of group phenomena. The multiple-regression approach permits the researcher to ascertain how completely he is able to explain the variability of a dependent variable by a given series of independent variables.

Basically, the substantive purpose of the book is to account for the variation or differences among the 125 Standard Metropolitan Areas in the United States with a population of 100,000 or more in 1950, with respect to: (1) total rate of metropolitan growth (Chap. 2); (2) degree of metropolitan suburbanization (Chap. 3); (3) rate of metropolitan suburbanization (Chap. 4); and (4) rate of central city growth.

Definitive results are precluded by the lack of adequate in-

[1] Bogue, Donald J. and Harris, Dorothy L.: Comparative Population and Urban Research Via Multiple Regression and Covariance Analysis. Oxford, Ohio, Scripps Foundation for Research in Population Problems and Chicago, Population Research and Training Center, 1954, 75 pp. $0.90.

dices of the variables of interest in the study. The dependent variables leave much to be desired.

In the first discussion the available data approach most closely the desired conceptual clarity. It was found that the six ecological variables often used in the past to explain metropolitan growth account for only 27 per cent of the variability of metropolitan growth in per cent population increase 1940–1950 of the 125 S.M.A.'s. The addition of the variables, growth rate of these S.M.A.'s 1930–1940, and regional effect, increased the accountable variability to 69 per cent. These last two variables, however, are non-ecological and non-theoretical. The conclusion offered from this analysis is "At the present time no set of ecological variables has been explicitly formulated that could effectively explain metropolitan growth between 1940 and 1950."

In the succeeding illustrations the problem of choosing measurable dependent variables that satisfy conceptual clarity appears to be acute and the findings are not as definitive as the first illustration. The ecological and non-ecological variables account for only 39 per cent of the variability of the degree of suburbanization represented by the per cent of the S.M.A. population residing in the ring in 1950, and 45 per cent of the variability of the per cent of the ring population residing in rural areas in 1950.

In almost all the illustrations the independent variables which contribute most to an explanation of the variability of the dependent variable are non-ecological and non-theoretical. These are such things as the regional effect, per cent growth and growth rates of the same S.M.A.'s during 1930–1940, and generally, the same dependent variable for the preceding decade.

The need for further investigation of these variables and the formulation and introduction of, heretofore, unknown variables to explain the variability of urban and suburban growth is evident. With all the information presently available, Bogue and Harris fail more often than not to account for more than half of the variation among the 125 S.M.A.'s.

Although not highly important, it is not clear whether the hypotheses were selected to demonstrate the methodology or the methodology was selected to test the hypotheses.

Despite possible disappointments in the present instance, the approach is promising and may have wider application in other fields of the social sciences as well as urban research.

This didactic monograph offers a challenge to demographers and urban sociologists to seek new variables and hypotheses that may further explain differential urbanization and suburbanization, and to all social scientists it presents a demonstration of a potential tool for research.

ERWIN S. SOLOMON

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Interrelations between the Social Environment and Psychiatric Disorders. 1952 Annual Conference of the Milbank Memorial Fund. 1953. 268 pages. $1.50.

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